COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

March, 1937

Agreement

EVERYBODY who has the best interests of the coal industry at heart will join in the hopes expressed by leaders on both sides at the opening of the new Appalachian wage conferences last month that the deliberations be carried to a speedy conclusion without threat of strike or suspension of operations. No small part of the dislocation of the industry for which men now engaged in it are paying dearly can be traced back to earlier recurring interruptions to production. Prudent buyers, of course, always will build up reasonable reserves for contingencies, but persistence of a feeling of insecurity with respect to a steady flow of coal only strengthens the position of competitive sources of energy. If assurance can be substituted for insecurity, both management and men in the industry will profit.

Blower vs. Exhaust

EXPERIMENTS to determine the relative value of blower and exhaust ventilation in clearing the air of dust in narrow headings, made by the Amalgamated Anthracite Collieries, Ltd., of Great Britain, are described by A. Nelson in a recent issue of *Colliery Engineering*. These experiments showed that what was regarded as a dangerous concentration of dust existed for only five minutes after firing when a blower fan was used and for as much as twenty-five minutes when the air was drawn out of the end of the ventilating pipe by the same fan operating as an exhaust. The fan was made to give equal volumes of air — 920 cubic feet per minute — in both directions.

Dust particles larger than seven microns were not considered when the count was made. Results would have been more conclusive if the finer, lighter and more dangerous dusts alone had been considered and if the air pipe had been near the floor rather than slung from the crown of the steel rings by which the roof was supported. The exhausting fan gave effective ventilation for only two yards ahead of the pipe, whereas, with a blowing fan, the air was effective up to the face, where, though five yards distant, much turbulence was evident. More of such studies are needed.

No United Front

REVIVAL of proposals to attempt stabilization of the bituminous coal-mining industry through federal control finds the operators again unable to agree upon a common program which would command united support. This would be regrettable under any circumstances; it becomes doubly so at this time because, with a divided industry, the chances for sane revision of the Guffey bill are measurably lessened. And enactment of that measure in the form reintroduced by the gentleman from Pennsylvania in January would be unfortunate.

Objection, as *Coal Age* has endeavored to make plain in earlier discussions of the subject, is not against the idea of federal regulation in the abstract but against what appear to be Utopian and dangerous proposals for actual control. Fixing minimum price levels for each district has much to commend it, and probably would be much more workable than an attempt to establish such minima for individual mines or companies. But, when the proposal is broadened into a correlation of prices for the greater part of the vast producing area east of the Mississippi River plus Iowa and western Kentucky, the practical difficulties involved are staggering.

Experience during NRA days is illuminating. When Washington discovered simple price correlation too thorny to handle, it turned to allocation as a control lever. Unfortunately, the whole system bogged down before the dangers of proration could be fully exposed. This too easy step still has many advocates who decline to recognize, first, the check strict allocation places upon incentives for greater efficiency and, second, that allocation is really a disguised attempt to dictate to the buyer, who is beyond the effective control of regulatory commissions. The net result, therefore, is loss to the industry.

Stabilization of bituminous coal mining is a complex problem. The repeated failures of the industry itself to unite on any plan is convincing evidence on that point. This does not mean, however, that efforts to find a solution should be abandoned as hopeless; on the contrary, they should be continued and be encouraged. But short-cut answers must be suspect.

Calcium-chlorided Roads

DUST is undesirable in roadways and manways for both men and equipment—for men because dust is harmful to their lungs, for equipment because it increases wear. But calcium chloride alone makes a road sloppy. With a wetting agent, however, the British Safety in Mines Research Board has found that the two work well together. Both the calcium chloride and the wetting agent usually are applied by watering cans with rose nozzles; the wetting agent is applied first.

In a main return traveling airway, 1½ to 2 per cent of calcium chloride in the floor dust sufficed to bind it and the floor remained firm and uneroded for months. Even a drift with some gradient gave good results when uniformly sprayed with 1,344 pounds of calcium chloride in 576 U. S. gallons of water, using two treatments each of 4.8 gallons per 100 square feet of roadway. The surface dried rapidly and, after three weeks, was barely damp and quite firm, with 10 per cent of water and 2 per cent of chloride in the dust.

Experiments elsewhere have shown that more chloride must be used where the air is nearly dry, but that with nearly saturated air 1 per cent of chloride will give 10 per cent of water. Dust can be swept off the surface, but, if left under travel, it soon becomes part of the roadbed. The cost of treatment for chemical alone in Great Britain ran from $120 to $330 per mile with a roadway 10 feet wide. Wetting agents are made by a host of chemical companies and are of varying cost and wetting characteristics.

Hopes—and Realities

IN PRESENTING proposals for a shorter work-day, a guaranteed minimum annual income and vacations with pay, spokesmen for the United Mine Workers at the Appalachian wage conference last month said that these demands voiced the hopes and aspirations of the men in the pits. There is no reason to challenge this statement or to decry the hopes thus expressed. In part at least they may even presage objectives which will be realized in the continued evolution of an industrial society. Unfortunately, however, what may be socially desirable and what is economically possible are not always synonymous.

The economic situation in the coal industry today is such that the granting of these demands would be financially suicidal. Were management imprudent enough to consent, the rank and file of the miners themselves would be the worst sufferers. Guaranteeing workers 200 days of employment or its equivalent in pay, for example, in the present state of the industry could have but one result: paring down each mine payroll to the irreducible minimum of steadily employed men and keeping employment at that level. The outlook for the jobless miner would be dark indeed.

Few industries—certainly few in comparable position to that of the coal industry—can match its wage record and improvement in working conditions in recent years. The coal industry is properly proud of that record; proud to have been in the van in shortening hours and in increasing hourly rates of pay. But, until industry in general catches up with it, coal-mine management quite justifiably may object to being used as a guinea pig for further experiments in social advance. A successful operation and a dead patient would feed and clothe no coal miners.

CONVEYORS ON LONGWALL

+ Cut Number of Roads to Be Maintained

At Macon County Mine

MECHANIZATION with shaker conveyors on 760-ft. faces is the latest step in the evolution of operating methods at the Macon County mine of the Macon County Coal Co., Decatur, Ill. Opened in 1900 by the Manufacturers & Consumers' Coal Co., the mine was operated on the room-and-pillar system for about six or seven years thereafter, when a change was made to advancing longwall. The first of the shaker-conveyor units went into service in June, 1935, and the second in September, 1936. These two units, with supplementary pit-car-loading equipment, were accounting for approximately 40 per cent of the average daily output of about 1,000 tons at the end of last year. Plans call for the installation of additional units to handle the entire mine tonnage.

The Illinois No. 5 seam worked at Macon County averages about 4½ ft. in thickness and is overlaid by about 600 ft. of cover. The bottom is fireclay, in which the cutting is done, and directly over the coal is an average of 24 in. of black slate. Over the black slate in some sections and absent in others is a heavy, sulphur-bearing "band rock" running up to about 24 in. in thickness. This in turn is overlaid by a hard soapstone. Over the soapstone is a layer of strong sandstone varying from 15 to 25 ft. in thickness.

As the mine serves primarily Decatur and vicinity, large coal is an important element in its business, which in turn has influenced the mining system employed. Actual shipments of 6-in. lump vary from 35 to 40 per cent of the total, and in addition some large coal is crushed at times. Longwall mining, which permits the coal to be picked and wedged down with a minimum of shooting, is an important factor in this high yield of coarse coal. In fact, shooting is the exception rather than the rule, as the subsidence of the roof on the pack walls employed is sufficient to break down the cut in the majority of cases.

Adoption of the conveyors was preceded by an investigation which eventually took mine officials, including D. W. Beggs, general manager, to England and Germany. The major incentive behind the change was the cost of maintaining through areas from which the coal had been completely extracted the large number of "branches," similar to rooms in the usual system of mining, necessary when pit cars were taken to the face—a mandatory procedure under the hand-mining plan now being displaced. With the two conveyor units now in service and including the pit-car-loader places operated in conjunction with them, approximately 2,250 ft. of face is served by 21 branches. If mine cars were taken to the face, two and one-half times as many places (52 to 53) on 42-ft. centers, as compared to 50 ft. in mechanized sections, would have to be kept open, in addition to the cost of the extra trackage, etc. Another factor which had to be taken into account in the selection of a new system was that it must not reduce the output of coarse coal. Conveyors, it was concluded, would

Loading station for a conveyor face, showing the car-loading elevator and in the right background the drive end of the mother conveyor.

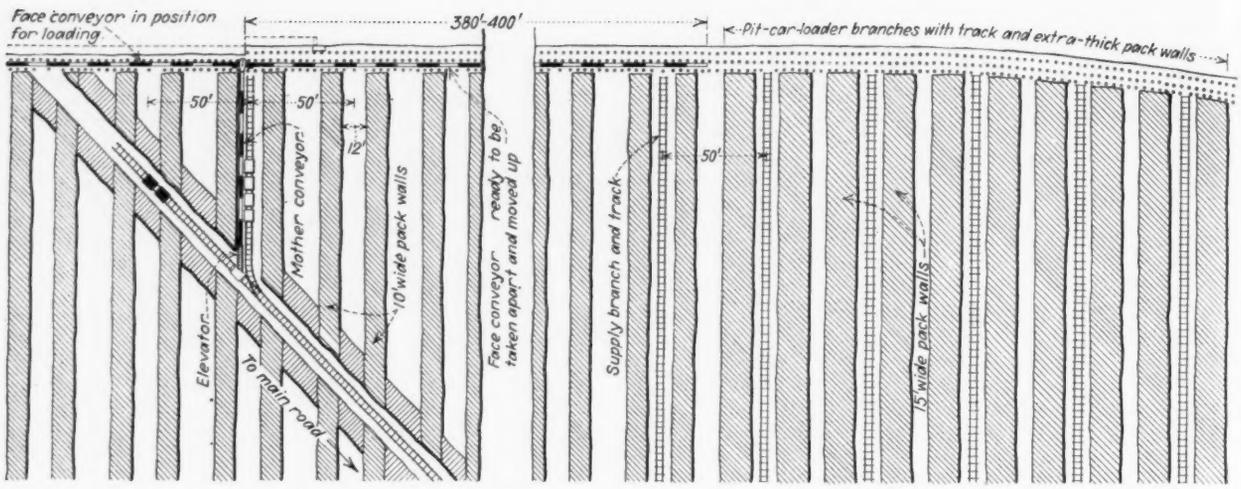


Fig. 1—Section of a conveyor face at the Macon County mine, showing location of loading and supply tracks and conveyors and also the relation of the conveyor face to the pit-car-loader places.

permit retention of the original plan of picking and wedging down the coal and at the same time would obviate keeping open a part of the branches that otherwise would be necessary.

Identical except for the sizes of the driving motors, the Macon County conveyor units each consist of two 380-ft. shaker-type Ladel face conveyors, capable of extension to 400 ft., one 300-ft. shaker-type mother conveyor and one chain-and-flight elevating conveyor for lifting the coal to mine-car loading level. The original units were driven by 10-hp. motors, but, as a result of service tests, 15-hp. motors were specified for the new units. Each face conveyor in a unit is provided with its own motor and drive, while one motor operates both the mother conveyor and the elevator. Trough, or pan, length is 10 ft.

The working plan with conveyors is shown diagrammatically in Fig. 1. Both the face conveyors feed to the mother conveyor located midway of the 760-ft. section of face which they serve. As the face advances, the mother conveyor is lengthened by moving the tail trough back and adding 10-ft. pan sections. When the face has advanced far enough so that the mother conveyor is fully extended, the mother unit is taken apart and its drive and the elevator are moved to the next loading point (estimated to be moved once a year). When a parting has been laid or other suitable car-changing facilities have been installed, the unit is ready for another cycle of extraction. Further advance involves repeating the above operation, the mother conveyor, elevator and track following the face conveyors as they move forward.

Pack walls also follow the face conveyors as they move forward much as they would follow the face if mechanical transportation equipment were not in use, the chief difference being that it is not necessary, with the exception of the mother-conveyor and supply-track branches, to keep all the branches open to accommodate haulage tracks. However, they, or what would correspond to them under the previous system, still are carried forward primarily as a source of material for pack walls. These pack walls, or "buildings," as they are termed at the mine, are carried forward in pairs separated by a distance of 12 ft. This 12-ft. distance between walls corresponds to the normal branch width. Branch, or room, centers on the conveyor sections are 50 ft. and the width of the pack walls is 10 ft. As the face advances, the black slate is taken down over the 12-ft. widths and employed with other material (horsebacks, cuttings, etc.) in the construction of the pack walls. For every cut the face advances, the pack walls immediately are extended a corresponding distance. The walls normally afford enough support to hold roof subsidence to 6 to 12 in. 25 ft. back from the face. As the face advances, roof and floor gradually come together, meeting when the face is about 300 ft. away.

The two conveyor faces at Macon County form part of continuous longwall face about 8,000 ft. long corresponding roughly to a segment of a circle. The conveyor faces are adjacent and are separated by a group of five branches laid with track for pit cars. On the opposite ends of each conveyor face is a similar group of five branches each, or, including the center group, a total of three groups for the two conveyor faces. Pit-car loaders are installed in the five-branch groups, with crews hand-loading onto them by the day. In addition to their value as a source of reserve tonnage during the experimental period of conveyor installation and at present as a means of taking up a part of the slack in case of a breakdown, fall or other trouble on a conveyor face, these five-branch groups also serve as a medium for isolating the conveyor faces from each other and also from the remainder of the main longwall face. This isolation is accomplished by the construction of special pack walls to act as barrier pillars and confine trouble, if it should occur, within a single conveyor section or prevent trouble from outside from coming into the sections. Each of the five branches in a group is paralleled by a building 15 ft. wide constructed of the hard, strong band rock which is taken down along the roads. The extra width of the walls and the extra strength of the materials permit these buildings to function as barriers. The presence of track in the places facilitates procuring the band rock and transporting it to the point of use—another reason for carrying these groups forward with rails and cars.

Under the working schedule at the Macon County mine, one of the two face conveyors in a unit is being moved up and the coal cut while the other wall is being loaded out. Undercuts, as noted above, are made 4 ft. deep in the fireclay under the coal, using Sullivan CH-8 longwall mining machines. Two such machines are employed for cutting not only the face for the two conveyor units but also for a number of branches driven with track and pit cars. The machines follow one

another around in a closed circuit, and when one reaches the end of the face it is loaded and taken around by road back to the starting point.

When one 380-ft. section of a conveyor face is cleaned up and timbered, the loaders and timberman move over onto the other 380-ft. section and start work. Meanwhile, on the first 380-ft. section, the panmen take the conveyor apart, move the trough sections up through the timbers and re-lay it behind the row of timbers next to the face. The mining machine works in the 3-ft. space between the last row of timbers and the coal. Next the driving head, with 13-ft. drive section of pan, is moved ahead. Rock men then start taking down the black slate in the 12-ft. pseudo-branches and extending the pack walls. When the pack walls are completed, the 380-ft. section of face is cut and then is ready for the loaders.

The loaders first throw back the clay cuttings, or mining dirt, and then start taking out the face. Usually it is necessary to sprag the cut after the mining machine, and by first snubbing the coal and then removing the sprags it is possible to drop or wedge it down and roll it out where it can be attacked with a pick, with occasional pop shots where necessary. As the coal is removed, single props 3 ft. apart are set in front of the conveyor line, so that when all the coal is out a new line of props is in place. The maximum number of prop lines is three just before the pack walls are extended. In the course of this extension the rear line is removed, leaving two lines, one on each side of the conveyor, in service until loading of the coal starts. The coal is passed through the line nearest to the face onto the conveyor.

Starting a fresh cut on a conveyor face. The coal is passed through the timbers. The illustration also shows the end of a pack wall and also the brushing from which the material is obtained.

With the conveyors, an absolutely straight face is necessary, which has the additional advantage, together with keeping pack walls advancing on schedule, of reducing the likelihood of a squeeze. When the two conveyor units now in service were installed, the sections of the face to be covered were first run with a transit, after which humps were cut back to permit the conveyors to be laid on a straight line, which automatically is carried forward thereafter. In addition to the road in which the mother conveyor is located, a 760-ft. conveyor face is served by two additional roads, with track, for convenience in bringing in supplies, chiefly timber. One such supply road comes in at one end of a 760-ft. face (Fig. 1) and one at the other. Props and similar material are placed in the conveyors, which shake them down to the proper spots along the face. Light trucks running in the conveyor line are used for certain types of material which cannot be transported conveniently in the conveyors.

The full-time list of men employed on a conveyor unit comprises the following: eight loaders; two car trimmers, stationed at the loading elevator; two panmen, one timberman and five rockmen and pack-wall builders. Adding in cutting-machine men and the relay motorman in proportion to their time on the conveyor section brings the average crew up to 18½ men, who average approximately 125 tons per day—generally not less and sometimes 10 to 25 tons more. Counting in the pit-car-loader places operated in conjunction with a conveyor unit brings the total crew membership up to an average of 35 men, including drivers, tracklayers and other employees needed in the pit-car-loader branches. This force of 35 men produces from 200 to 225 tons per day, using the conveyors and pit-car loaders. Mine cars holding an average of 2,800 lb. are used to transport the coal from the loading points to the shaft bottom. Cars are shifted under the loading elevators by hand, one trimmer usually being sufficient, with the assistance of the grade, for this task, although both are available when necessary.

Mother conveyors at Macon County receive coal from two face conveyors (note brushing for pack-wall material).

POWER DISTRIBUTION

+ Tuned to Meet New Mining Conditions

At Boone County's Sharples Mine

IN REVAMPING its electrical distribution system during the past year the Boone County Coal Corporation, Sharples, W. Va., changed the metering point to the center of distribution, installed a demand meter in the dispatcher's office underground, moved d.c. substations to the inside, changed two substation units from manual to full-automatic control and rebuilt the automatic control of an older unit. New measures of safety, ruggedness and simplicity were written into specifications of the new controls. The a.c. panels and starting compensators are combined into steel cubicles which have no exposed live parts.

The mine, situated in Logan County but shipping over the Coal River branch of the Chesapeake & Ohio Ry., produces 2,750 tons per day, hand loading, from an area of Chilton seam averaging 65 in. in thickness. The coal is top cut and gathering is done with cable-reel locomotives. Many grades are encountered, but, generally speaking, the average grades are in favor of the loads.

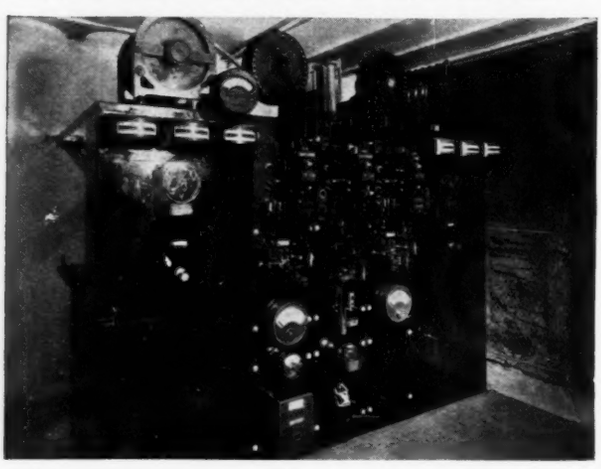
A modern preparation plant containing wet-washing and sizing equipment demands about 150 kw. The total 15-minute demand of the outside plant and the mine is approximately 1,000 kw. and the energy consumption in a month of full-time operation reaches 325,000 kw. Power is purchased at 2,300 volts from the Appalachian Electric Power Co. under the new L.P.O. tariff which contains a power-factor clause.

The old distribution system had been set up for a mine of lower tonnage and shorter maximum hauls. Increased tonnage, normal development and a shorter workday and shorter week had brought about a condition where the substations were too far from the load centers and the 2,300-volt a.c. lines feeding them were too small, thus causing transmission losses approaching 10 per cent.

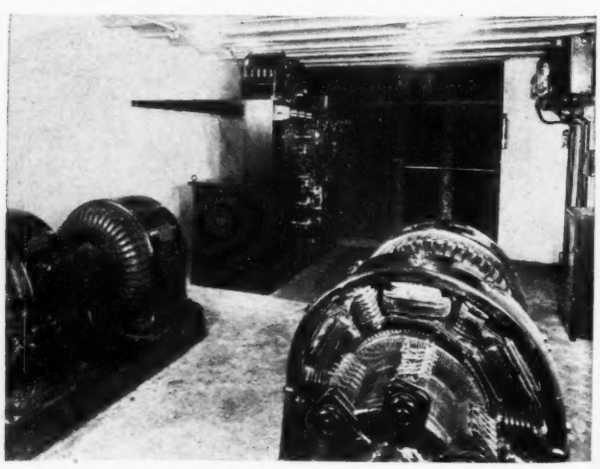
When planning the moving of substations closer to load centers it was necessary to decide whether the 2,300-volt distribution would be continued or a change made to 4,000 volts. Because all of the 2,300-volt motors of the substation motor-generators had Y-connected windings and could not be adapted to 4,000 volts without the heavy expense and delay of complete rewinding, and because all of the coal that is likely to be hauled to the present preparation plant is within the practical range of 2,300-volt distribution, it was decided to maintain that voltage.

The first step was to request the power company to move its substation about one mile to the load center of the operation and provide an automatic reclosing circuit breaker on its 6,600-volt feeder line. As shown on the accompanying map, that changed the position of the metering point to a junction of the 2,300-volt pole lines feeding three underground substations and close to an outside substation which through a borehole feeds d.c. to an outby section of the main haul. The new location reversed the direction of power flow in the existing 2,300-

Totally inclosed cubicles contain all the a.c. equipment for full-automatic control of two 2,300-volt 150-kw. synchronous motor generators in the C2 substation



Braces are seen extending overhead from the cubicles to the wall. These were found to be unnecessary, however, as the cubicle is stable on its own base



volt line between the tipple and new metering point and left only the tipple and house lighting loads on that section of the line.

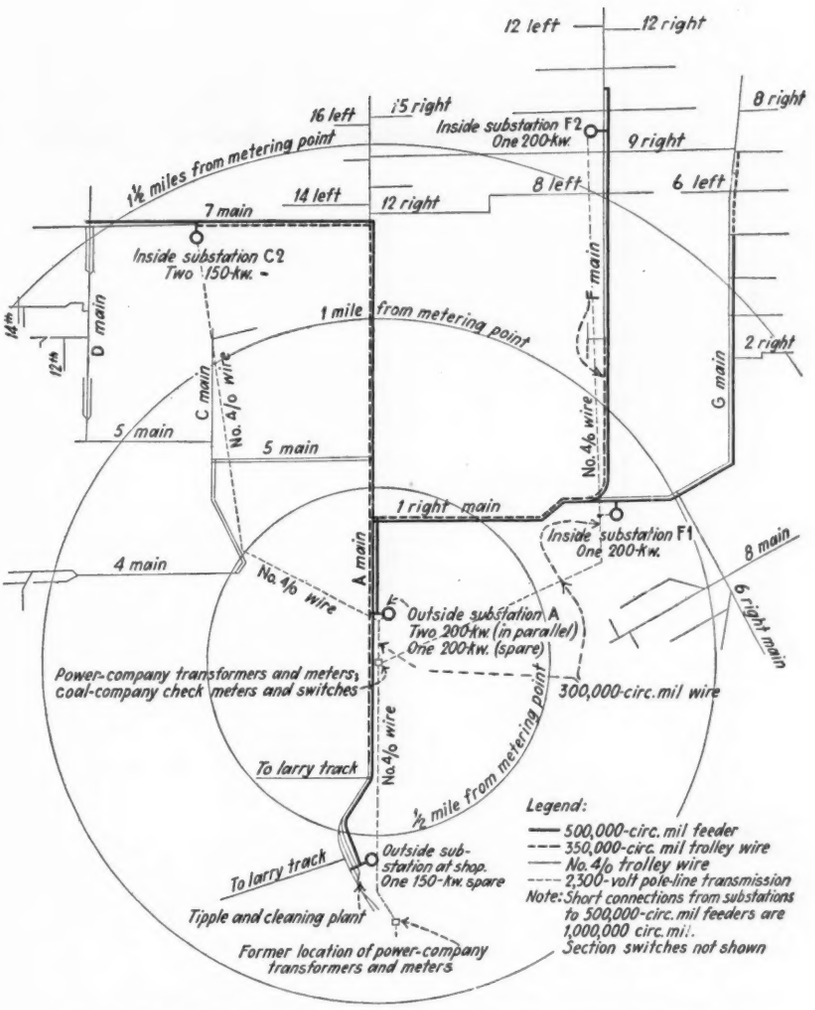
Alongside of the power company's substation, consisting of three 500-kva., 6,600/2,300-volt transformers, the coal company built a distribution tower and under it a small building which houses a set of check meters and individual oil circuit breakers for each of the three radiating lines. These lines were rebuilt with larger conductors so that the maximum losses will not exceed 5 per cent at peak loads. The line extending to the left leads to boreholes which feed substations F1 and F2 and a mine pump. The line extending to the right feeds outside substation A, two fans and inside substation C2. The third line, which feeds the tipple and house lighting, extends approximately 4 miles along the valley.

Two 150-kw. General Electric synchronous motor-generator sets now operating in the inside substation designated as C2 on the map were formerly in the outside substation near the tipple and had manual controls. It was in connection with this change to a remote point inside of the mine that the new full-automatic controls having totally inclosed a.c. panels were purchased.

These were made by the Electric Controller & Manufacturing Co., Cleveland, Ohio, and utilize the EC&M oil-immersed automatic compensator which was developed some years ago for steel-mill service and has been applied to many types of service demanding one or more of the features of ruggedness, self-contained completely wired unit, vapor-proof construction, complete inclosure of live electrical parts and protection against dust, moisture and corrosive fumes. Immersed in the oil is a thermal control strip which opens the control circuit if the oil temperature should approach an abnormal figure.

The several a.c. relays and contactors necessary for the automatic starting, protection and remote control of the synchronous motor are mounted on slate panels which are completely inclosed in a steel cubicle attached to the compensator itself. Bracing to the wall or ceiling is unnecessary, although it was applied in the first Boone County installation before it became evident that the unit was stable on its own base.

Two 275-volt d.c. generator panels and a feeder panel are mounted between the two a.c. cubicles. Each of these three panels carries Type KSA automatic breakers and the feeder panel equipment includes a



Map of 2,300-volt pole lines and 275-volt underground trolleys and feeders after revamping of the power distribution

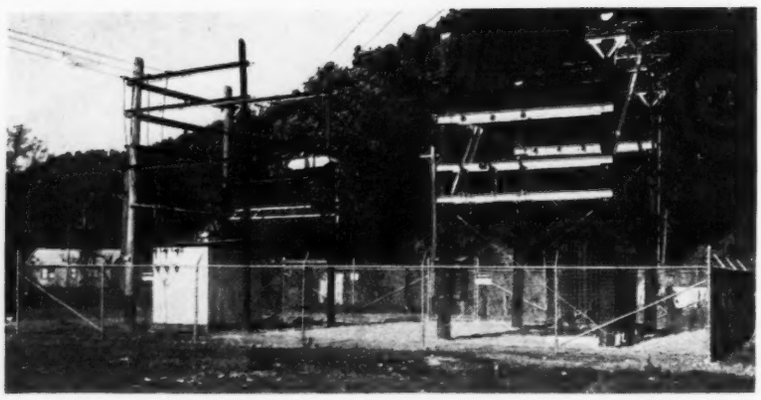
1,600-amp. Klamp-Tight knife switch. The breakers and switch were made by the Automatic Reclosing Circuit Breaker Co., which recently was absorbed by the I-T-E Circuit Breaker Co., of Philadelphia. Relay connections are such that an overload on either generator causes the feeder breaker to trip, thus preventing seesaw.

The equalizer connection between generators is tied solidly, thus eliminating the cost and complication of an automatic equalizer switch. The apparent objection of divided field current and less compounding when but one generator is operating has proved to be of no consequence.

An advantage of this permanent equalizer is that it acts in some degree to reduce overcompounding of a single generator during temporarily high d.c. demands in that immediate vicinity, thus permitting generators situated farther away from the load to furnish a part of the power. The controls include a field-warming resistance and contactors for keeping the shunt fields of the idle generator warm so that when an additional generator is required it can be started and paralleled with the operating generator from a remote station without complicated and expensive shunt-field regulating equipment.

Because the 2,300-volt contactors of this No. 10 size automatic oil-immersed compensator have an interrupting capacity many times normal (according to the manufacturer it has withstood tests of breaking 11,000 amp. at 2,500 volts) no line switch is included in the substation equipment. Disconnects are installed between the borehole cable and the conduits leading to the compensators. The total floor space occupied by the complete control board for this two-unit substation is 35x110 in.

The borehole is 200 ft. deep and the three-conductor No. 2/0 cable has insulation for 5,000 volts without lead sheath and has wire armor. In the borehole casing with the main cable is a No. 2 bare copper wire which is connected at the upper end



To the left is the coal company's 2,300-volt distribution tower at the new metering point

to a ground in a near-by creek and at the lower end to the mine track. It is tied to the casing at the top and bottom ends and to the equipment ground in the substation.

Also in the same borehole is a seven-conductor control cable (five conductors in use and two spare) which is a part of a control circuit extending to the outside shop adjacent to the tipple. From the location the substation units are started and stopped. The substation room in the mine is kept locked and only the electrical maintenance men have keys. On the control board in the shop are mounted switches for starting and stopping, also signal lamps for indicating when each individual generator is on the line. These are grouped with similar controls of three other full-automatic stations.

The recent power changes included installation of another inside substation, the No. F2, which appears at the upper right-hand corner of the map. The 200-kw. synchronous motor-generator unit of this substation had been equipped with an early type of Cutler-Hammer full-automatic control some years ago when it was in another location.

To make this control apparatus meet, as far as possible, the present standard of compactness and simplicity it was completely rebuilt and rearranged onto two panels. The auto-transformer, oil switches, control and instrument transformers are mounted double-deck on a pipe frame of small floor dimensions. This frame is set back from the panels but is bridged to them by overhead bracing. This arrangement, together with clearance from the wall, allows access from all sides.

To limit the current of a possible short circuit on the trolley wire near a substation and to reduce to some degree the peak load that a main-haulage locomotive may impose on a substation as the trip passes, the first or closest connections from the 500,000-circ.mil substation feeders to the trolley wire are situated about 500 ft. from the substation.

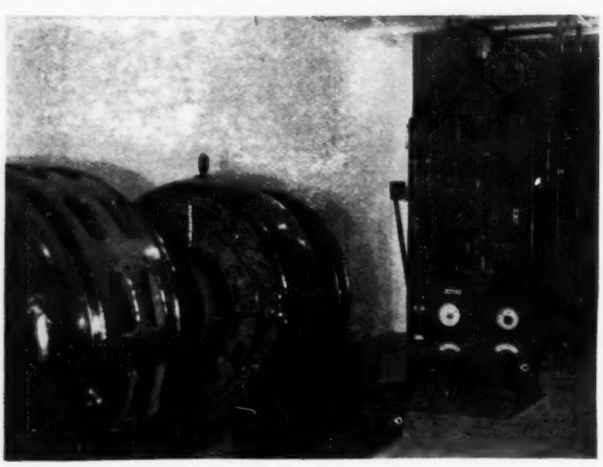
In order that nothing be left undone toward reducing the cost of mine power, a remotely operated a.c. demand meter registering total mine power was installed underground in the dispatcher's office, which is situated about half a mile from the purchased-power metering point. Observation of the meter pointers makes it possible for the locomotive dispatcher to regulate the haulage so that the most economical demand will be maintained with the least possible penalty to the haulage.

The demand meter is a General Electric Type GM10 which has a register showing total kilowatt-hours, two pointers indicating actual and ideal demands (the latter adjustable), a clock hand showing time progress of the 15-minute demand interval, contacts which engage momentarily at the ending of each time interval and demand alarm contacts. The latter sound a bell calling the attention of the dispatcher to high demand. If he judges it advisable, he may operate control switches to open temporarily one or more of the d.c. reclosing circuit breakers in the substations.

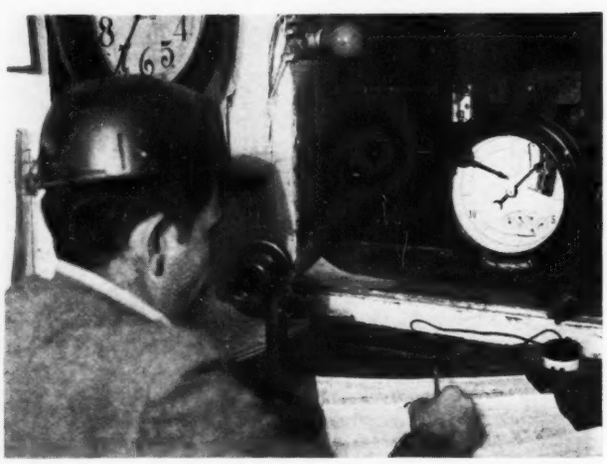
It was necessary to install a four-conductor cable from the metering point to the demand meter. This cable extends ¼ mile underground then up through a borehole and ¼ mile on a pole line. The new demand meter is operated in parallel with a General Electric Type G9 graphic demand meter situated in the coal company's check-meter station. It was necessary to add a relay to relieve the watthour-meter contacts of the increased duty of remote operation of the new meter.

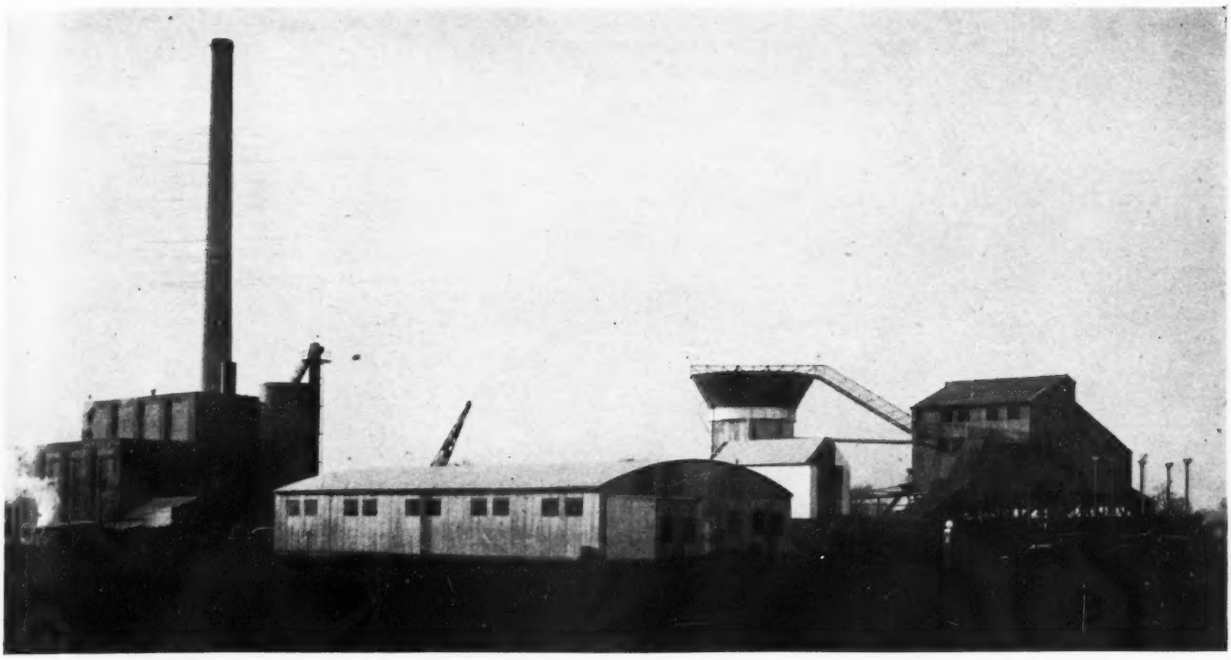
Operating officials of the Boone County Coal Corporation headquartering at Sharples are: A. S. Wilson, general manager; H. L. Copher, general superintendent; C. B. Locke, electrical engineer, and C. B. Scholl, chief engineer.

Full-automatic control in new F2 substation is an early type completely rebuilt and rearranged into a compact unit



Demand meter installed on the dispatcher's desk, about one-half mile from the purchased-power metering point





Little Sister mine is equipped with a power plant (left), garage, repair shop and wash house (front center), and tipple and washery (right). The dump house for the trailers is just behind the right end of the garage.

WASHERY AND POWER PLANT

+ Round Out Equipment Program

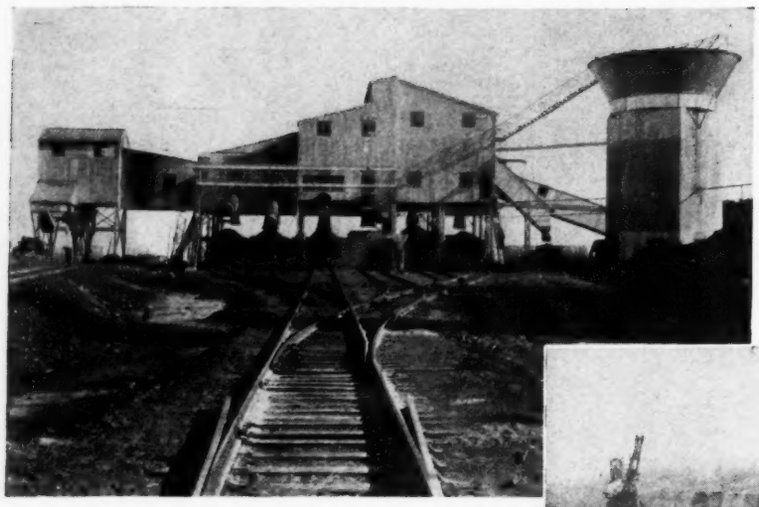
At Central State Stripping

DESIGNED for an average production of 60,000 tons per month over a calendar-year period, the new Little Sister strip mine of the Central State Collieries, Inc., St. David, Ill., is equipped not only with electric stripping and loading equipment and trailer-haulage units but also with a washing plant for minus 2-in. coal and a 2,750-kw. power plant for supplying energy for the entire operation. Preparation facilities are provided for shipping six primary sizes, of which three are washed, as well as any combination desired. Crushing equipment also is installed for breaking down large coal when desired, and provision is made for dustless-treating all sizes. Loading pockets and scales make truck shipments possible.

Little Sister mine complements the original stripping operation of H. J. Sternberg, of St. Louis, at Mindenmines, Mo., operated under the name of the Minden Coal Co. The Cherokee seam, with an average thickness of 36 in., is recovered at Minden No. 1, while Little Sister extracts the Fulton County (Ill.) No. 5 seam, averaging 5 ft. in thickness. Little Sister shipments are made over the Chicago, Burlington & Quincy R.R. from St. David, and the coal is distributed in the Northwest and northern Illinois east to and including Chicago by Walter Bledsoe & Co., under the trade name "Super-Test."

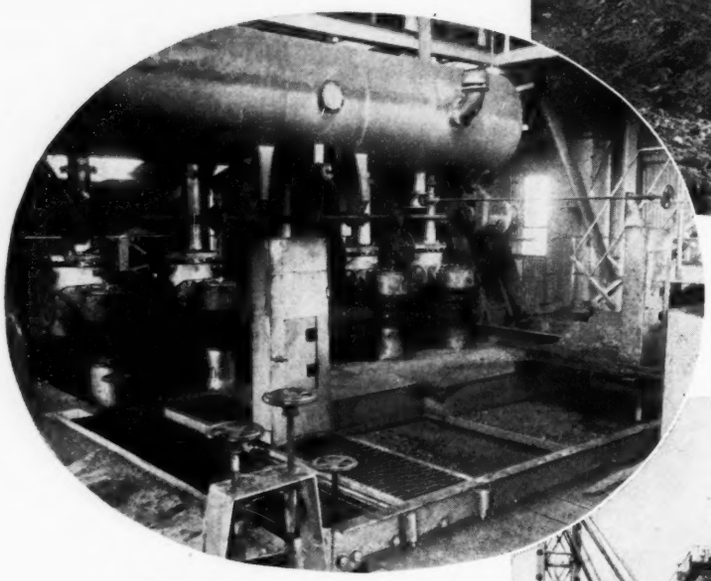
With a minimum of 8 ft. and a maximum of 55 ft., average overburden thickness at Little Sister mine is 34 to 35 ft. Over the coal is 3 to 4 ft. of black shale and cap rock, the latter sometimes absent and in other places running up to 10 in. in thickness. In some areas the cap rock lies directly on the seam and in others it is separated from it by a layer of black shale. Clay constitutes the remainder of the overburden, which is removed, without blasting, by a Bucyrus-Erie 550B electric shovel having a 16-cu.yd. welded "Man-Ten" steel dipper with counterbalances; 95-ft. boom; and a 63-ft. cylindrical dipper stick with rope crowd. Its capacity, in the overburden being stripped, is 500,000 cu.yd. or better per month.

The coal is loaded by an 85B electric shovel with 5-cu.yd. welded Man-Ten coal dipper. Prior to loading, the coal is drilled with a jackhammer outfit supplied with air by a 200-c.f.m. Ingersoll-Rand compressor mounted on an auto truck. The com-



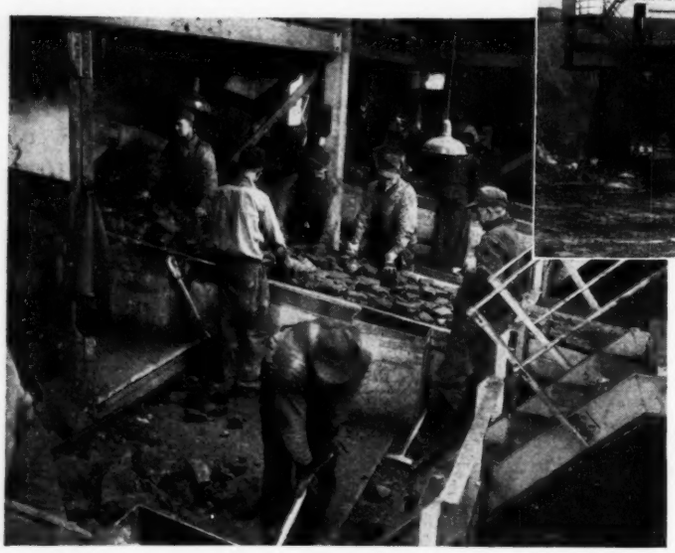
Little Sister preparation plant. The washer is over the right-hand tracks, with the picking tables in the center and the crusher and truck-loading plant at the left.

An electric shovel with 5-cu.yd. dipper loads the coal into 23-ton trail cars in the Little Sister pit. The 16-cu.yd. electric stripping shovel appears in the background.



Screenings are cleaned in this five-cell washing unit with electric-eye reject control

Stripping with the 16-cu.yd. shovel with counterbalanced dipper at Little Sister mine.



Picking floor in the Little Sister preparation plant, where lump and large and small egg are prepared. At the right is the mixing conveyor.

pressor is operated by a 40-hp., 440-volt motor. Shotholes are loaded with Atlas or Hercules pellet powder, which is fired with electric squibs. A Caterpillar 45 diesel tractor with Bucyrus hydraulic-lift bulldozer cleans the top of the coal ahead of the loading shovel. A washer for coal under 2 in. makes it unnecessary to sweep or use air for cleaning in the pit.

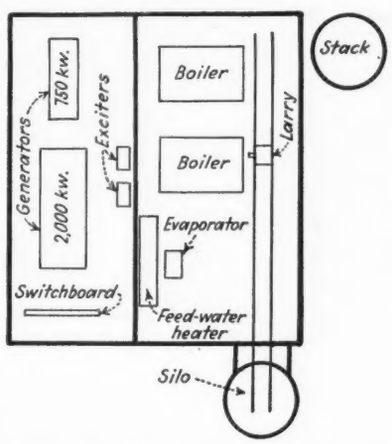
Standard pit width at Little Sister is 75 to 80 ft. From 40 to 45 ft. of coal is loaded per cut, leaving a 30-ft. coal berm on which the trailer units operate. This width is sufficient to permit the trailer units to turn behind the loading shovel where necessary. Four trailer units are in operation at the present time for an output of 3,000 to 3,300 tons in seven hours. Each unit consists of a White 691-SD-453 tractor with Austin-Western trail car holding, as loaded, an average of 23 tons. Round-trip haul at present is 1⅛ miles. One or two more similar haulage units will be added in the future when the round-trip haul will average 3 miles.

Circle Haulage Planned

Main roads are constructed of "red dog" (burnt shale) and tipple refuse. The coal to be stripped lies in a long, relatively narrow body running roughly north and south, and the road system is planned to provide a circle haul from the dump hopper to the pit and back again. Main roads are constructed through the spoil bank roughly paralleling the face, with runways into the pit approximately every 1,000 ft. Each time the pit moves 1,500 to 2,000 ft. away from a main road, a new road will be constructed through the spoil to shorten the length of the runways.

Trucks and other transportation equipment are stored and serviced in a 70x90-ft. building with corrugated-steel sheathing and rounded roof supported on wooden trusses. In addition to storage space for six trailer units and for other haulage and tractor equipment, this building also includes along one side a machine shop and service floor and in one corner on this same side a wash room with facilities for 55 men. Gasoline, diesel fuel and dustless-treating material are received in tank-car lots and are unloaded into three 12,500-gal. storage tanks, one for each type, located along one tipple track. The dispensing tank and pump for gasoline is located at one corner of the garage building along the trailer return road, with the diesel dispensing equipment at the other corner. Dispensing tanks are fed by gravity from the main storage tanks.

Ditching on the high wall for drainage is performed by a utility dragline (Northwest) with 1½-cu.yd. bucket having perforated sides for lightness. The coal lies above the natural drainage level, which makes it possible, by leaving openings in the spoil bank, to drain the pit as a rule to Little Sister Creek to the east. For local dewatering work where natural drainage cannot be employed, 2-, 3- and 4-in. 440-volt self-priming pumps with 4-in. suction and discharge lines are employed, in addition to two gasoline-powered portable units, one 3-in. and one 4-in. Hose lines make up the suction and discharge connections. All the pumping units, together with starting equipment in the case of electric



Diagrammatic layout of the Little Sister power plant, showing major units.

units, are skid-mounted. A grader and miscellaneous road-maintenance and dirt-moving equipment are provided, together with a Caterpillar 65 diesel tractor to operate them. In addition to road maintenance, this latter unit takes care of miscellaneous excavating, filling and construction work around the mine plant, leaving the bulldozer-equipped unit primarily for service in the pit, although it can be and is used elsewhere when not in coal service.

Electrically operated pit equipment at Little Sister mine is supplied by a ground-cable distribution system receiving current at 4,000 volts from the power house. Both the stripping shovel (General Electric motor-generators, motors and controls, variable-voltage control) and the loading shovel (Westinghouse motor-generator, motor and controls, variable-voltage control) operate off the 4,000-volt circuit. All other electrically operated pit equipment is powered by 440-volt motors receiving current from auxiliary transformer and control stations placed as required, at the junction boxes on the high wall.

Approximately the first 200 ft. of the circuit from the power house to the pit is a lead-covered cable, to which is connected the main ground cable. This ground cable (General Cable Trenchlay, 1/0 wires) is made in 600-ft. sections. Between adjacent sections is a junction, or service, box which serves both as a means of connecting the various sections of the main cable and also as a plug-in point for the auxiliary transformer stations and the trailing cables to the stripping and loading shovels. All connections are made with Miller cable connectors. All cables carrying 4,000 volts are grounded back to the power house, where a welded connection is made to the deep-well pump casing. Depth of the well is 615 ft.; depth of the casing is 490 ft.; and depth of the pump barrel is 250 ft.

Installation of Cables

The General Electric shovel cables are specified for 5,000-volt service, while the General Cable trailing cables for 440-volt auxiliary equipment (compressor, pumps, etc.) are specified for 600 volts. Cables 2,000 ft. long were installed on both the stripper (No. 1 wires) and the loader (No. 8 wires) to permit the maximum of operation without changing cable connections on the high wall. In the erection stage at the property, power was supplied by two portable self-contained generating units. One was made of a 100-hp. Caterpillar diesel engine driving a 62½-kva. generator (used on the power plant, tipple, etc.) and the other comprised a Waukesha gasoline engine with a 125-kva. generator (used on the stripping and loading shovels). Both units still are available for carrying loads within their respective capacities at points where it is impractical to run a separate circuit.

Rated capacity of the Little Sister preparation plant, designed and installed by Link-Belt Co., is 450 tons per hour. Primary sizes, as a rule, are the following: 8-in. lump, 8x4-in. egg, and 4x2-in. small egg (all are hand-picked and boom-loaded) washed 2x1½-in. nut (boom-loaded), 1½x¾-in. nut, and ¾-in.x48-mesh screenings. A mixing conveyor permits loading of a hand-picked and washed mine-run or any other combination of the primary sizes. When necessary, lump, egg or small egg can be crushed and returned to the same track for loading or can be returned to the main sizing screen

for recirculation through the plant. Washing is done in a 5-cell Link-Belt Simon-Carves washer with "electric-eye" reject control. Provision also has been made in the design of the plant for the installation of a second washing unit in the future to permit wet preparation of all coal up to and including small egg, if desirable.

Coal from the pit is dumped by the trail cars into a 75-ton hopper, from which it is removed by a feeder and discharged onto a belt conveyor leading up to the head of the main shaker screen. This screen separates the feed into four sizes: 8-in. lump, 8x4-in. egg, 4x2-in. small egg, and 2-in. screenings. The lump and egg sizes, after passing over degradation screens, are discharged onto shaking picking tables, one for each size. Picking is arranged to yield two reject products—one pure refuse (rock, slate, sulphur, etc.), and the other material consisting of a combination of coal with refuse. The pure refuse goes into one compartment of a refuse-and-boney conveyor, and eventually into the main refuse conveyor, while the other class of pickings, containing coal values which can be salvaged, goes into the second compartment of the same conveyor and is carried to a two-roll crusher. This conveyor compartment also receives the degradation from the lump and egg sizes, which also pass through the crusher. The crusher product (minus 2-in.) is carried up to the head of the main sizing shakers by a gravity-discharge conveyor-elevator and started through the system for eventual cleaning in the washer.

After picking, the lump and egg sizes, unless mixing or crushing is being done, go to their respective loading booms. Gates in the lower ends of the three tables, however, permit diverting any or all of the three sizes to the top strand of the mixing conveyor, which runs past the discharge ends of the tables. When mixing is being done, these sizes, together with any or all of the washed sizes, if included in the combination, are diverted through gates to the proper loading tracks. If lump or egg or all three are to be crushed, however, they are carried on past the loading gates to a two-roll crusher set between the upper and lower strands of the mixing conveyor. The crusher can be adjusted to break the coal down to as low as 2 in., this crushed material dropping onto the lower strand of the mixing conveyor for return to the loading point or to a gate leading to the gravity-discharge elevator, which carries the coal up to the main shaker for resizing and routing of the minus 2-in. fraction to the washer.

The mixing conveyor also serves the truck-loading plant, which includes two loading bins with gates and, in a separate structure, a set of Fairbanks-Morse scales. When any size or combination, including the washed sizes, is to be run to the truck-loading bins, the gate over the crusher is closed, with the result that the coal is carried on past to either one or both of the bins.

Minus 2-in. material from the main shaker screens is elevated to the washer. It will be noted that the feed to the washer includes not only coal fresh from the pit but also the minus 2-in. size from any material recirculated over the main shaker. Washer refuse normally goes directly to the refuse pocket, but provision is made for setting down the boney crusher and running the refuse material to it for crushing and recirculation via the gravity-discharge elevator and the main shaker.

Cleaned coal from the washer flows with the water to a washed-coal classifying screen. This screen, suspended on wooden springboard hangers, is made with two screening decks for separating out the 2x1½- and 1½x¾-in. nut sizes, and a lower collecting trough to receive the water and minus ¾-in. coal through the two upper decks. At the discharge ends of the screening decks the respective nut sizes pass over slot-type pickers,

Little Sister power plant. The deep-well pump supplying water for the entire operation is in the small building in front of the power house.

Steam is supplied by two boilers fed by a self-propelled weighing larry running on the narrow-gage track in the floor in front of the furnaces.

which remove flat material — primarily refuse difficult to take out in the washer. Flats through the pickers normally go to the refuse pocket, although provision is made for recirculating the material from the $1\frac{1}{2}$x$\frac{3}{4}$-in. nut to the main shaker screen. If mixtures are being made, both nut sizes can be diverted to the top strand of the mixing conveyor. Otherwise, the 2x$1\frac{1}{2}$-in. nut goes to a loading boom and the $1\frac{1}{2}$x$\frac{3}{4}$-in. nut to a loading chute.

Minus $\frac{3}{4}$-in. washed coal from the classifying screen flows with the water to two high-speed dewatering screens equipped with sieves having $\frac{1}{2}$-mm. openings for removing water and fine material of approximately 48-mesh. Dewatered coal over the screens goes to a loading chute or to the mixing conveyor. The latter, in addition to other combinations, is designed for making screenings combinations on the end opposite the truck-loading plant.

Handling Water and Slurry

Water and slurry through the dewatering screens runs by gravity to a sump, from which it is elevated to a settling cone by a 3,000-g.p.m. American Well Works pump. Clarified water from the settling cone flows back to the washer, while the slurry settles to the bottom of the cone and is elevated to two cylindrical wooden settling tanks by a 100-g.p.m. Chicago pump. The make-up water connection is taken into the discharge pipe at the bottom of the settling cone, which makes it possible, in case the slurry packs, to flush it free by opening the valve in the make-up water line. An auxiliary line from the top of the tank to the discharge pipe allows clarified water to be used for the same purpose when desired. After draining in the two wooden tanks, the slurry, which is used for power-plant fuel, is taken out with a clamshell and piled for further dewatering. Water from the drainage tanks flows to a storage pond, from which it can be picked up for reuse when desired.

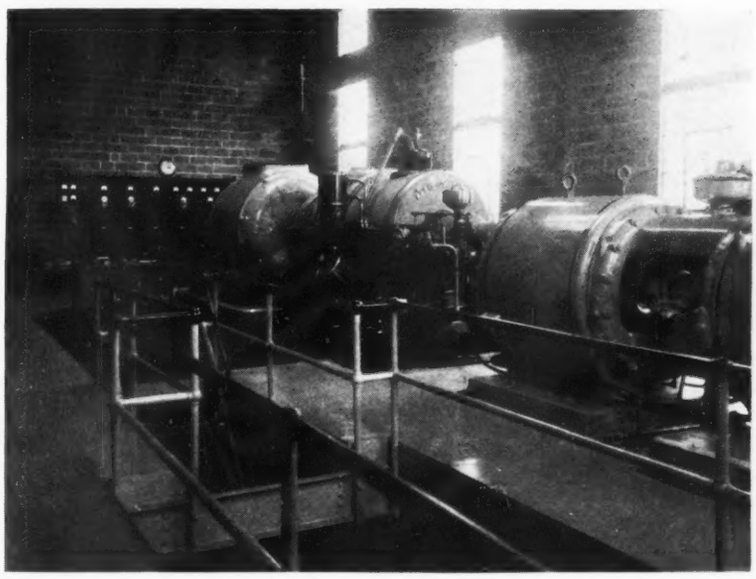
Preparation-plant equipment also includes a Viking installation for application of hot-oil vapor for rendering the coal dustless. Plans also call for using this system in the winter for the application of anti-freezing compound to the washed sizes. Pending this step, "Koltreat" is thrown into the washed coal by hand to check freezing. Forty-four General Electric 220-volt motors aggregating 485 hp. (including boom-hoist, heat-diffuser and certain auxiliary units) operate the equipment in the preparation plant. Wiring is inclosed in conduit, and starting buttons and controls are grouped at central points in the plant. Steam for the heat diffusers is supplied from the power-plant boilers. Electrical energy for the tipple motors is supplied by a separate 4,000/220-volt transformer station.

Control of quality of the output of the preparation plant is placed in the hands of a chemist, who is provided with facilities for sampling all sizes of coal, particularly screenings, and with a complete chemical laboratory for making analyses. Cars are handled under the loading points and in the empty and loaded yards by a 30-ton Plymouth engine with Cummings diesel engine. Refuse is handled by a Euclid two-way side-dumping tractor truck with a capacity of 6 cu.yd.

Power for the operation of all electrical equipment at the Little Sister mine is supplied by a 2,750-kw. generating plant. Designed around reconditioned boiler, generating and, with some exceptions, auxiliary equipment, and eventually to consume the slurry from the dewatering screens in the washery, the power plant represents an investment of approximately $200,000. Ample generating capacity has been installed to permit taking on additional loads in the future. Plant design and purchase and reconditioning of equipment were handled by C. M. Garland & Co.

Generating equipment consists of one 2,000-kw. Allis-Chalmers-Parsons turbo-generator and one 750-kw. General Electric-Curtis turbo-generator. The latter is for use on idle days or at times when only the stripping shovel is working, although it is capable of carrying the tipple, loading shovel and certain auxiliary loads. Nominal line voltage is 4,000, which is maintained automatically by a Tirrell regulator. Two 500-hp. Babcock & Wilcox water-tube boilers with Coxe steam-driven stokers supply steam at a working pressure of 175 lb. gage. One boiler normally can take care of the plant load. Furnace walls are air-cooled, the heated air being taken into the furnace under the fire.

Equipment is housed in a steel-frame brick-and-hollow-tile building with basement, which cost just $350 more than the estimated figure for a steel-frame structure with steel-sheet siding and roof. The boiler room is separated from the turbine room by a partition extending down through the basement. The boiler breeching is brought out at the top of the boiler room to a concrete stack. At the opposite end of the boiler room is a 100-ton concrete coal silo served by Link-Belt coal-handling and elevating equipment. A track laid from beneath this silo through a passageway into the boiler room and across the front of the boilers permits the use of a 2-ton self-propelled weigh larry to feed the stoker hoppers. Link-Belt conveying equipment also is employed to remove ashes, which fall into hoppers in the boiler-room basement. Hopper ca-



Turbo-generator room in the Little Sister power plant. In front of the switchboard is the 2,000-kw. generating unit with the 750-kw. unit next to it. Exciters, not shown—are along the wall at the right. Auxiliaries are installed in the basement.

pacity is sufficient to accommodate the output of ashes in an entire 8-hour shift. Forced-draft equipment also is stationed in the basement under the boilers.

Turbo-generator units are placed in line in the turbine room with the dual exciter units at one side, and a six-panel metering and central board at one end. The 4,000-volt bus trips and other 4,000-volt switching equipment are placed in the basement, with the trips operated by manual switches on the panels, directly under the board. The board takes care of the six major circuits, as follows: shovels, tipple, house service (power-plant auxiliaries, light circuits, miscellaneous electrical loads), each turbo-generator and the exciters.

Also in the turbine-room basement are the various auxiliaries for the generators, the pumps, etc., including the surface-type condensers. Cooling water is pumped to a 250,000-gal. spray pond by a 3,600 g.p.m. circulating pump. This spray pond also serves as the source of make-up water for both the washer in the tipple and the power-plant boilers, and as such receives the discharge of the 15-hp., 150-g.p.m. Pomona pump in the deep well noted above. This pump operates about 16 hours per day to supply the requirements of both the washer and boiler plant.

Make-up water for the boilers is at present passed through an evaporator with a capacity of 2,400 lb. per hour. In the future, however, it is thought that in addition some boiler compound will have to be added to the water. Both steam and electrically driven exciters, circulating pumps, forced-draft fans and vacuum pumps are provided, this system permitting the exhaust from these units to be used in heating feed water when the evaporator is not in operation. A thermal-tube automatic feed-water regulator is installed. Boiler-feed pumps automatically are regulated by governors operating either on the throttle (steam type) or in the discharge valve (motor-driven centrifugal type).

Exclusive of supervision, the power plant is operated by three men on each shift—engineer, fireman and ash handler. In addition, coal handling is the task of one man working one shift per day. The principal duty of the coal handler is to remove slurry from the two wooden drainage tanks to which it is run from the wash-water settling cone and pile it, to permit further drying. Using the same clamshell, the coal handler also transfers dry slurry—or, rather, slurry with a reduced moisture content—to the silo elevator hopper. Normally, slurry from the drainage tanks is turned several times in the pile to give it as much opportunity as possible to dry.

Eventually, when a sufficient dry supply has been accumulated, it is planned to use this minus ½-mm. (48-mesh) material exclusively in the power plant. As found in the pile, the slurry, running about 6,250 B.t.u. per pound, contains approximately 31½ per cent moisture and 20½ per cent ash. Until dry slurry is accumulated in sufficient quantities, however, the power plant is being fueled with an approximately 50:50 mixture of pile-run slurry and washed ¾-in. screenings directly from the tipple. As fired, moisture content of the mixture is about 28 per cent; ash, 15 per cent, and B.t.u., approximately 9,000.

Instantaneous demand on the generating equipment, when both pit and preparation plant are running, is 1,400 to 1,600 kw. Average demand under the same conditions is close to 800 kw. Average demand when the stripping shovel only is operating is 500 kw., in which is included the demand of the power-plant auxiliaries.

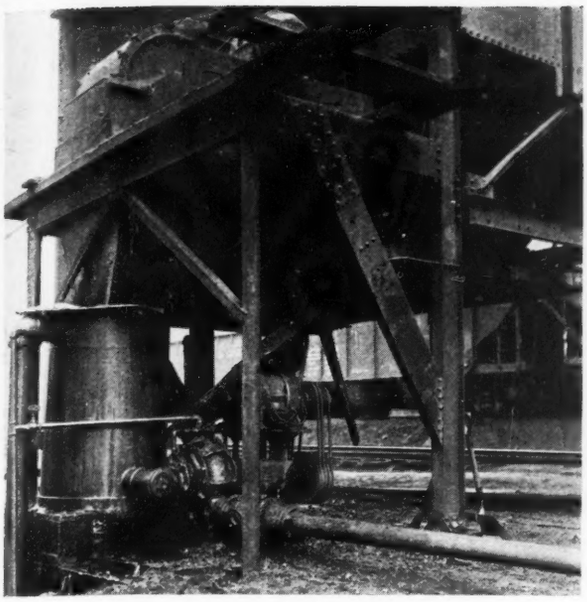
For the period Jan. 1-15, 1937, inclusive, when 28,492 tons of coal was shipped, energy consumption was: pit, 56,700 kw.-hr.; tipple, 18,000 kw-hr.; house service, 47,500 kw.-hr.; total, 122,200 kw.-hr. In this same period, consumption of slurry-screenings mixture was 732,900 lb.

HYDRAULIC DISPOSAL

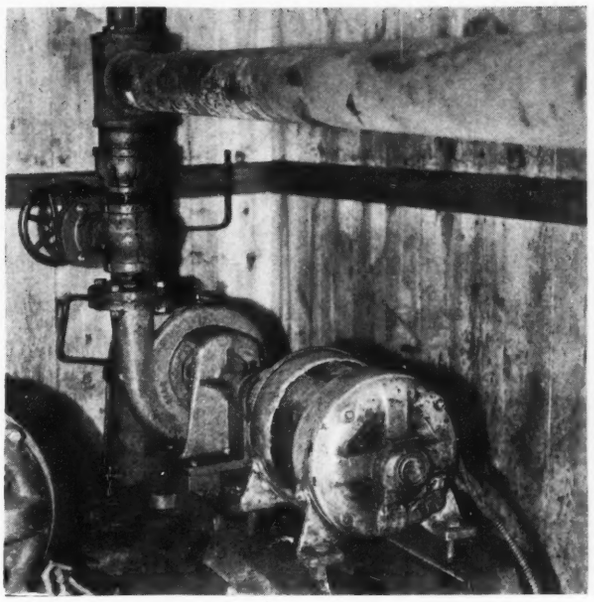
+ Of Refuse Saves $23.10 Daily

DAILY COSTS of refuse disposal from No. 1 mine of the Amherst Coal Co., Amherstdale, Logan County, West Virginia, have been reduced $23.10 by installation of crushing and pumping equipment which provides hydraulic transportation from the preparation plant to a dumping ground near by. When installed last September this refuse-handling equipment was considered more or less an experiment, but it has been operated continually since the start. According to A. S. J. Hopkins, manager of mines, who supervised a 26-day test on the disposal plant, a further reduction of $4.10 per day could be made by installation of a constant-rate feeder between refuse bin and pump.

The equipment consists of a crusher, water-supply pump, mixing tank (diameter, 4 ft.; height, 6 ft.) and a Hydroseal sand pump. All but the crushers—a hammer-type moved from another mine—are new items, and the heart of the installation is the Hydroseal pump, made by the Allen-Sherman-Hoff Co. It has connections for 6-in. pipe, is rated 1,500 g.p.m., has a shell and impeller of special alloy iron and is lined with Maximix soft rubber. The Hydroseal feature consists of a design which admits fresh water around each side of the impeller, into the volute and through a suction eye to prevent abrasive wear. Mounted atop of a plate of adjustable height is a 20-hp. General Electric 440-volt squirrel-cage motor connected to the pump shaft by an Allis-Chalmers Vari-pitch Tex-rope



Crusher, mix tank and sand pump installed near bin where refuse trucks once were loaded



This 600-g.p.m. unit pumps water from the creek sump to the mixing tank

drive which allows adjusting pump speed to suit pipe length.

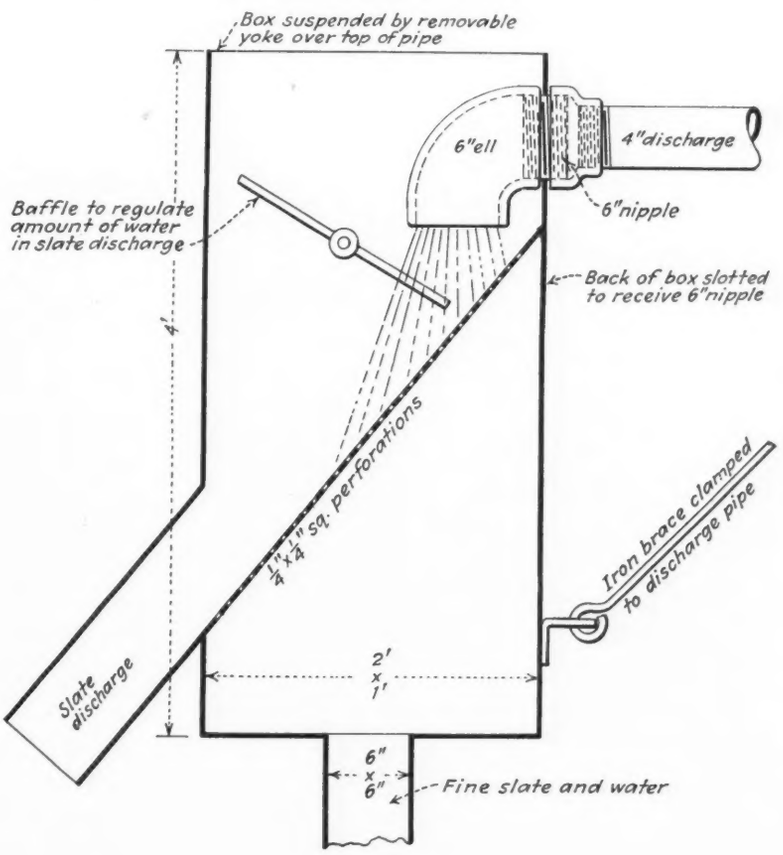
It was intended that no material larger than 3 in. should go through the pump, but the crusher, being of the hammer type and somewhat worn, allows a few flats larger than 3 in. to escape to the mixing tank. Once in a while these clog the outlet from the tank and therein lies the only difficulty that has been encountered. The pump discharge line, as used at present, is a 4-in. pipe 500 ft. long which rises 14 ft. in its length. Satisfactory operation calls for handling at least 80 per cent water and not over 20 per cent solids and maintaining a velocity of not less than 12 ft. per second in the discharge pipe.

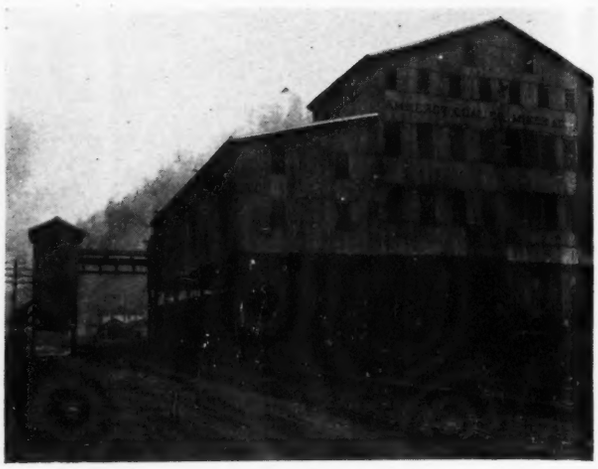
Waste materials from the preparation plant consist of refuse from washing ¼x2½-in. coal and of picking-table refuse which does not exceed cubes of 6-in. dimensions and is composed for the most part of slabby material. These wastes are fed to the crusher by a chute leading directly from the plant refuse conveyor discharge. Through an inclined screen plate having 2-in. round holes the smaller material is bypassed around the crusher to the mixing tank. The refuse bin from which trucks formerly were loaded is not utilized as a storage for the new system because that would have required a feeder and at the beginning it was desirable to keep the investment as low as possible.

Water is pumped from a creek pump to the mixing tank by a Weinman bronze-fitted 4x3-in. centrifugal pump rated 600 g.p.m., 35-ft. head, 1,750 r.p.m. and driven by a Westinghouse 7½-hp. 440-volt Type CS motor. In this case the pumping distance is but 25 ft. and the head 15 ft. When less than the maximum quantity of refuse is being handled and the full quantity of water is not needed, the surplus is bypassed back to the sump. Clear water for the seals is secured from a high tank (60 lb. pressure) which stores the supply for the plant washer.

Because of the percentage of oversize refuse material that is now

By a movable baffle in the discharge box the degree of water separation can be adjusted





Left—At the discharge an adjustable screen box separates a large percentage of the water from the refuse. The thin white stream of water appearing in this time exposure carries the refuse. The corrugated trough sloping to the left carries away the water that goes through the screen. Right—At extreme left on the ground beside the elevated bin is shown the refuse disposal unit.

allowed to go into the mixing tank and because of the variation of feed, an attendant is employed and this cost is $4.10 per shift. It is believed that this labor can be eliminated by more efficient crushing and by installing a constant-rate feeder to deliver from the storage bin.

It was found desirable to control the discharge water so that it would not spread over an area where it was not wanted and also so it would not carry the refuse in that direction. To accomplish this control a screening box was built for attachment to the discharge end of the pipe. It contains a sloping screen which drains a large proportion of the water to a trough leading down over the side of the pile. The refuse and a small quantity of water pass over the screen and drop directly onto the pile.

To prolong the life of the 4-in. steel pipe it is turned one-eighth of a revolution once a month. At the time of this writing it had handled more than 10,000 tons of refuse. The performance test, extending from Oct. 6 to Nov. 10, 1936, included 26 working shifts and the average quantity of refuse handled per shift was 98 tons. During that time the length of the discharge line varied between 100 and 500 ft. and the vertical lift was between 6 and 14 ft. Power consumption averaged 1.31 kw.-hr. per ton of refuse handled and the power cost was less than 3c. per ton. Adding to this the wages of the attendant brings the total direct operating cost to approximately 7c. per ton of refuse. The saving of $23.10 per day is that compared to the former disposal by shipping the washer refuse from the plant by rail and trucking the picking-table refuse.

Water separated in the discharge screen box flows away through the corrugated trough in the foreground

CHIEFTAIN 20 RESCREENER

+ Designed for Effective 10-Mesh Dedusting When Coal Is Damp

EFFECTIVE REMOVAL of the minus 10-mesh dust from 1¼- or 1½-in. screenings or, when desired, production of 1¼x⅜- or 1½x⅜-in. stoker nut and ⅜-in.x10-mesh dedusted carbon were the major commercial objectives in the installation of rescreening facilities at the Chieftain No. 20 mine of the Maumee Collieries Co., Keller, Ind., in November, 1936. From the engineering standpoint, attainment of these objectives involved the installation of ample screening capacity, screening in two stages to increase efficiency and adoption of a plant design and screening equipment which would permit satisfactory separation of the minus 10-mesh material even at times when the coal carried more than the normal percentage of moisture.

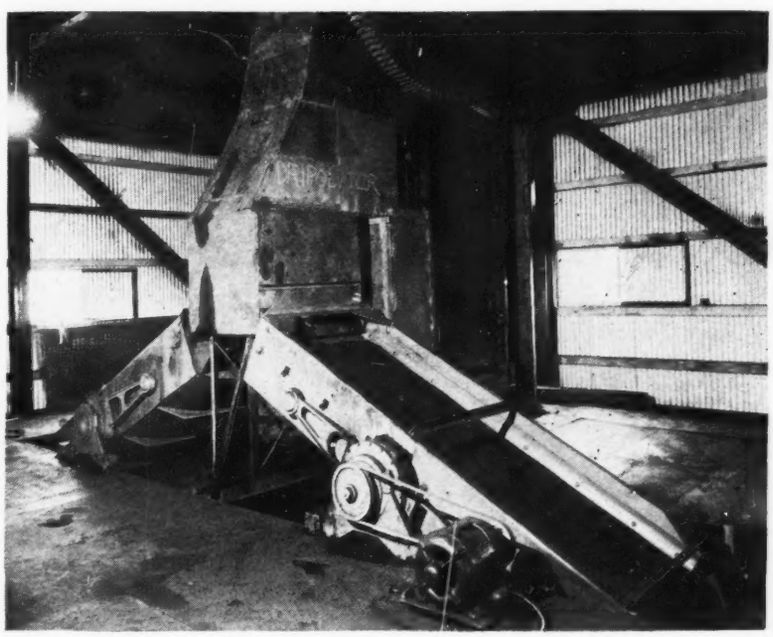
Chieftain No. 20 tipple and rescreener prepare and load Indiana No. 5 coal. Average thickness of the coal now being mined is 3 ft., and the rated capacity of the plant is 4,200 tons per shift of seven hours. Coal is loaded on seven tracks, including one track for box-car shipments. Primary sizes made in the plant, which was designed and built by the company, including additions, are normally: 6x4-in. furnace lump, 4x2-in. egg, 2x1¼-in. nut, 1¼x⅜-in. stoker nut and ⅜-in.x10-mesh dedusted carbon. The last two sizes are made in the new rescreening addition. Equipment also is provided for loading combinations of any or all the primary sizes.

All coal 6 in. or over is crushed and returned to the main shaker screens for resizing. Furnace lump, egg and 2x1¼-in. nut are hand-picked on the picking sections of apron-type picking table-loading booms, and 6-in. lump is picked on a separate apron-type table before crushing and return to the system for final preparation and loading with the rest of the coal. Pickings are run to a Bradford breaker for recovery of coal thrown out with the refuse.

Capacity of the rescreening plant is 300 tons per hour, or sufficient to handle the peak output of 1½-in. screenings. Normally, however, only 1¼-in. screenings, averaging approximately 40 per cent of the output, are prepared in the rescreening plant. Screening equipment consists of two 4x10-ft. single-deck Productive Equipment Corporation "Selectro" vibrators for separating the feed into 1¼x⅜- and ⅜x0-in. fractions and four additional 5x10-ft. "Selectro" units for removing the minus 10-mesh dust from the ⅜x0-in. fraction through the two primary screens. Each screen is driven by a 7½-h.p. motor through a single V-belt. Motor speed is 1,200 r.p.m.

Vibrators used in the Chieftain No. 20 rescreener are of the positive eccentric type giving a gyrating circle-throw motion to the screen cloth. Provision is made for eight adjustments of the throw, which are made by removing oil-case covers, loosening four screws, inserting ½-in. dowel pin and turning the driving sheave by hand to the new setting. The angle of tilt can be adjusted while the vibrator is running, and the direction of the throw can be reversed by reversing the motor. As all these adjustments can be made while the vibrator is running or by stopping it not over 15 minutes, it is possible very quickly to

Minus 1¼- or 1½-in. coal from the shaker screen in the main tipple is separated into 1¼ or 1½ by ⅜-in. and ⅜x0-in. fractions on these two primary vibrators in the Chieftain No. 20 rescreening plant.



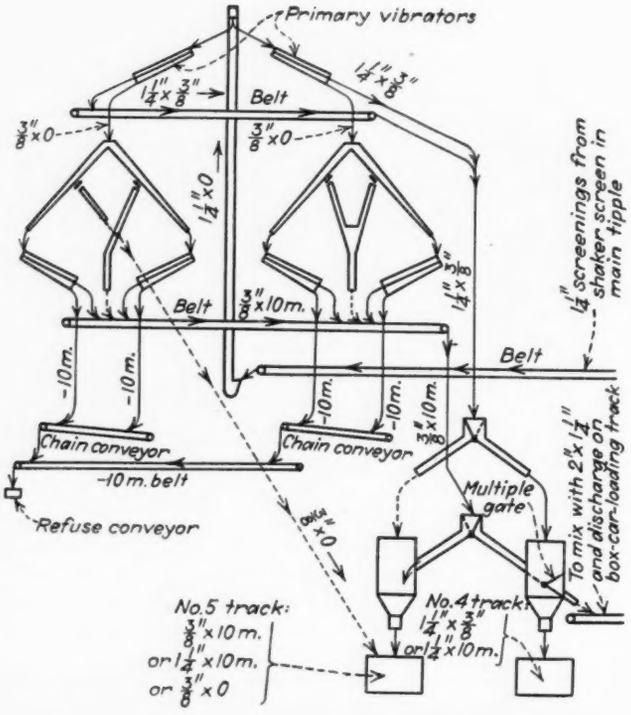


Fig. 1—Flowsheet, Chieftain No. 20 rescreening plant. Certain provisions for handling spillage, etc., are omitted.

vary the action of the vibrator to suit the character of the material, whether dry or moist.

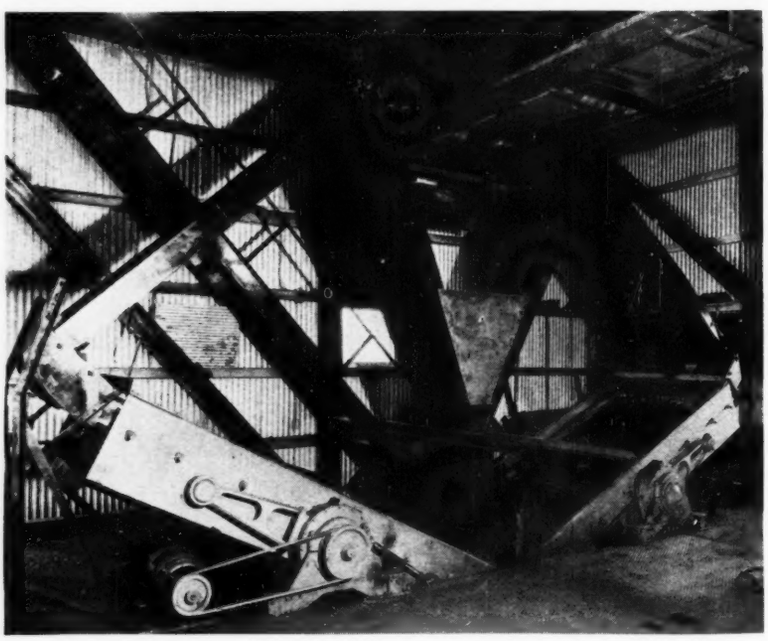
As the loading places at No. 20 are watched to prevent accumulations of water, the coal never comes to the tipple dripping wet. Quite frequently, however, the moisture content of the minus 10-mesh dust is such that it will stick together when balled up in the hand. Experience to date has proved to the satisfaction of mine officials, however, that while the efficiency of separation is reduced when the coal is damp, it is possible by the adjustments available to hold the coal on the vibrators long enough and change the throw to suit to obtain an effective commercial separation of the minus 10-mesh material with a minimum of blinding. When very damp coal is being run, it is only necessary to clean off the cloth on the 10-mesh units occasionally with a soft-wood paddle or wire brush.

Minus 1¼-in. coal (or 1½-in., if desired) is brought from the main shaker screen into the rescreening plant on a belt conveyor, which discharges into an elevator boot. The elevator lifts the coal to the top of the rescreener structure, where it is split into two equal parts and discharged onto the two primary 4x10-ft. vibrators, each equipped with a wire cloth with ⅜-in. square openings. Coal retained on the cloth (1¼x⅜-in.) is returned to the tipple for separate loading or recombination with other sizes. A transfer belt accomplishes the return in the case of one vibrator, while the other discharges directly into the chute system in the main tipple.

Minus ⅜-in. coal through the cloth on the primary vibrators discharges into chutes preceding the secondary vibrators, which are fitted with wire-cloth screens with 0.08-in. clear openings 3 in. long for the 10-mesh separation. Two of the secondary vibrators handle the minus ⅜-in. coal from one primary vibrator, while the other two handle the coal from the other primary vibrator. The chute systems preceding the two pairs of secondary vibrators, while differing in one respect, are both designed to divide the minus ⅜-in. coal from the primary vibrators into two equal parts, each of which is discharged onto one of a pair of secondary vibrators. The two main chutes to a pair of secondary units are equipped with slide gates opening into auxiliary chutes, through which, if desired, the ⅜x0-in. product can be bypassed around the vibrators onto the collecting belt for eventual loading without dedusting. In addition (see Fig. 1), one auxiliary chute set is arranged, in conjunction with a suitable gate, so that a part or all of the ⅜x0-in. coal can be run to the car without dedusting. This arrangement makes it possible to load both 1¼-in.x10-mesh dedusted screenings and ⅜x0-in. carbon. In this case, one pair of secondary vibrators may be taken out of service or operated on only a part of the normal feed of minus ⅜-in. material.

Dust through the 10-mesh cloths on the secondary vibrators is collected on chain-type conveyors,

Dedusting at 10-mesh is accomplished on four secondary vibrators receiving minus ⅜-in. coal from the primary vibrators. One pair of secondary vibrators and the chute system preceding them are shown in the above view. The two center chutes permit bypassing the minus ⅜-in. size around the vibrators when desired.



which discharge onto a transfer belt leading to the tipple-refuse conveyor. Dedusted ⅜-in.x10-mesh coal over the cloths is discharged onto a belt-type collecting conveyor leading to the chute system in the main tipple. The arrangement of this chute system is shown diagrammatically in Fig. 1, and it permits loading 1¼x⅜-in. and ⅜-in.x10-mesh on separate tracks, as well as recombination of both sizes for loading on either of the two tracks. In the case of the 1¼x⅜-in. size, for example, it is brought to the top of a divided chute, one leg of the chute running to a small loading pocket over one track and the other leg to a similar pocket over the other track. A fly-gate at the junction point of the two legs permits the coal to be diverted to either pocket.

A similar chute arrangement is provided for the ⅜-in.x10-mesh coal, with the two legs discharging into the same loading pockets as the chute legs for the 1¼x⅜-in. stoker nut. By throwing the gate in one divided chute one way and the gate in the other divided chute the other way the two sizes can be run to the two separate loading pockets. If both gates are in the same position, the two sizes are run to the one pocket.

In addition, to permit combinations of the sizes made in the rescreener with sizes made in the main tipple, particularly 2x1¼-in. nut, a multiple gate (Fig. 1) is placed inside the loading pocket over the No. 4 track. This multiple gate consists of four individual gates, and when all of them are closed, one or both the rescreener sizes, as desired, are discharged onto an auxiliary conveyor leading back to the main tipple and the box-car loading track. By closing less than four of the gates in the loading pocket, only part of the rescreener coal is diverted to the conveyor and the rest is run to the car on No. 4 track. Opening all the gates allows all the rescreener coal to follow its normal route to No. 4 loading track. This gate arrangement permits loading a 2x⅜-in. stoker nut or 2-in.x10-mesh dedusted screenings in addition to the primary sizes in the rescreener.

ACETYLENE COST CUT

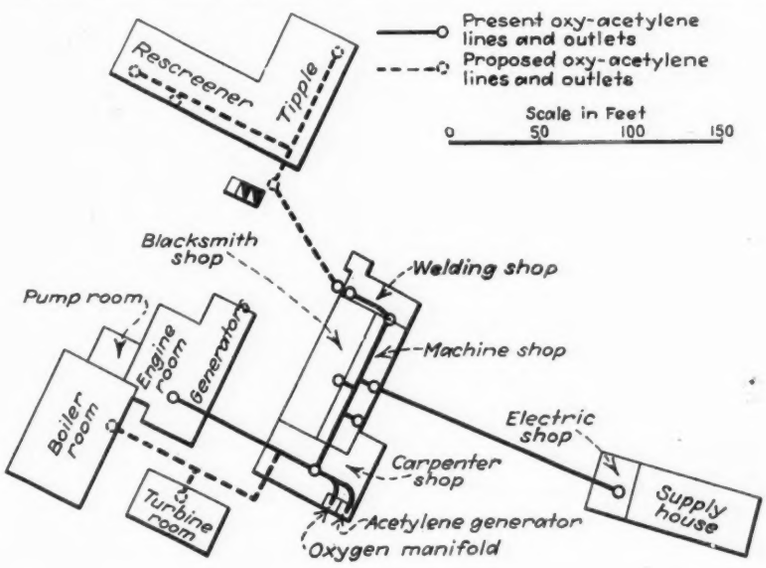
+ By Piping Gases to Points of Use

At Consolidated Coal Co. Mines

MECHANIZATION, with its attendant increase in the use of machinery, has resulted in a material increase in the magnitude of the maintenance problem at coal mines. Also, coal-mine preparation plants have lost many of the static qualities which once characterized them and now are subject to rapid change to meet new market demands. To a lesser extent, the same applies to other mine structures, although in this case the changes are made to make these facilities fit in with changing operating practices. As a result of the operation of these two factors—modernization and mechanization—the quantity of repair work, metal working and fabrication at the mine has greatly increased, widening materially the field of cutting and welding equipment in the coal industry.

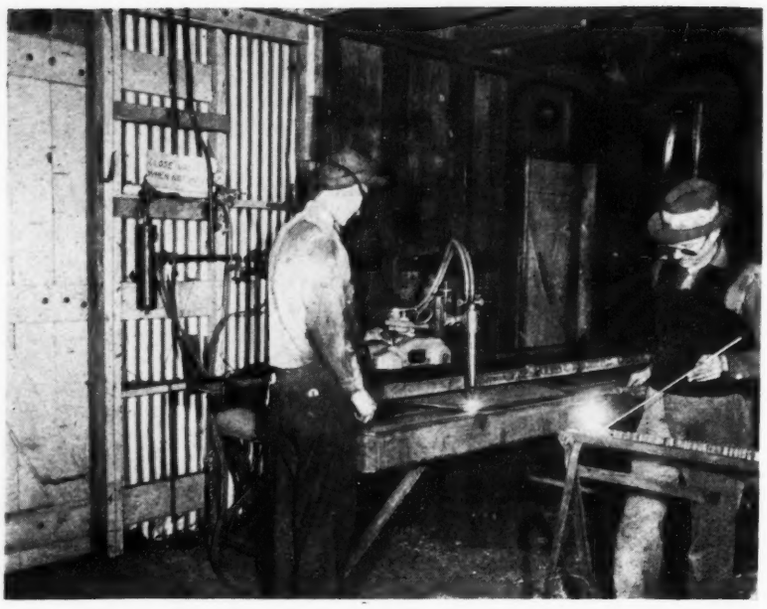
In common with many mining operations at the present time, the Consolidated Coal Co., operating mines at Staunton, Mt. Olive and Herrin, Ill., employs both arc welding and oxyacetylene cutting and welding equipment in repair work, metal working and fabrication both underground and on the surface. Applications range from repairing broken castings, cutting metal and fabrication to welding rail joints, building up worn parts, hard-surfacing and installing bonds. Welding and cutting operations—primarily the former—are carried clear to the

Fig. 1—New Monarch surface-plant layout, showing central acetylene and oxygen stations and pipe lines and outlets, both present and proposed.



face, and it is common practice to repair equipment, as far as possible, at the point of the breakdown, in which case the maintenance men, with the necessary welding equipment, go into the machine.

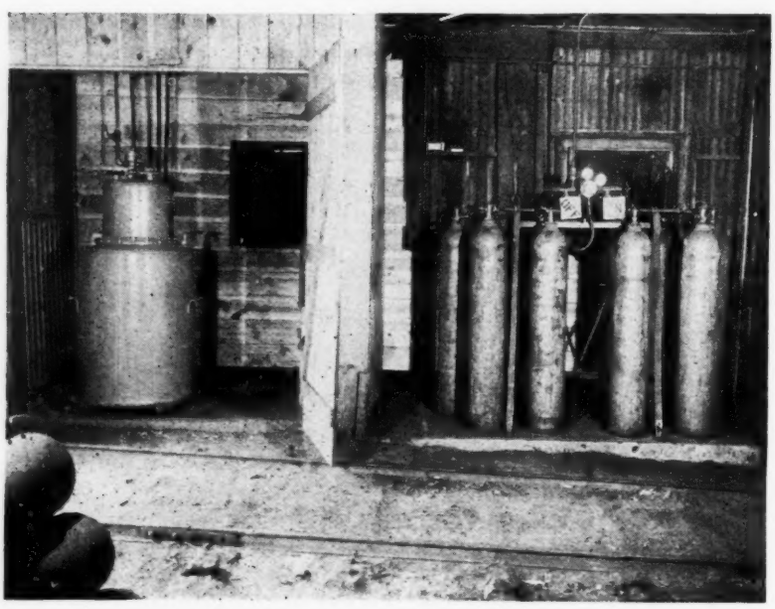
In addition to the advantages growing out of ability to make repairs immediately and in many cases on the spot, eliminating days at least and sometimes weeks of idleness while new parts were being obtained for broken-down equipment, welding also makes it possible to salvage expensive castings or parts by joining them together again and to recover such equipment as shafts, etc., by building them up and remachining them. Protection against wear by hard-surfacing, which in many cases permits redesign of equipment to include sliding instead of rolling supports, is another major function of welding equipment which, together with cutting equipment, has become one of the most versatile tools in the mine-maintenance or construction man's kit.



Outlets at convenient points in the various surface plants and shops facilitate changing from one welding job to another. Here one outlet on the wall at the left serves a shape-cutting machine and supplies gases for other welding and cutting applications, such as hard-surfacing cutter bits.

At Consolidated's New Monarch mine, Herrin, Ill., which normally averages 3,900 tons per day, all loading is accomplished with eleven Joy loaders, and all other mine activities have been mechanized to the maximum extent possible with equipment available at the present screen tipple supplemented by an elaborate rescreener equipped with shaker screens, picking tables and double-deck. Nordberg-Symonds dedusting screens, together with the necessary elevating, conveying and bin equipment for producing five primary sizes and mixtures, in addition to the two top sizes made in the main tipple. Other surface units include a boiler plant, turbine room, engine room (coal hoist), electric shop, machine shop, welding shop, blacksmith shop, carpenter shop, supply house, wash house, office, etc. The list of shops reflects in part the magnitude of the maintenance job at New Monarch, but, as indicated above, much of the repair work originating in the mine and in the other surface plants is done on the spot. When construction work is added to repair work, the possibilities for welding and cutting become almost limitless.

The heart of the oxyacetylene distribution system at New Monarch. The oxygen manifold and tanks are at the right, with the acteylene generator at the left.



In addition to arc-welding equipment, the growth in maintenance and construction volume was reflected in steady additions to oxyacetylene tank sets at New Monarch until a total of seven were in use on the surface alone in the early part of 1935. In view of the large volumes of acetylene required, as well as the time required in moving tank sets from place to place, the management undertook an investigation into the possibilities of reducing acetylene consumption by the installation of a different distribution system which also would eliminate all or at least a major part of the time lost in shifting tank sets. On the basis of this investigation it was decided to pipe acetylene and oxygen from a central station to hose outlets at convenient points in the various surface plants. Such a system was installed at New Monarch in the summer of 1935, and at the Mt. Olive No. 15 mine in the summer of 1936. The result at New Monarch has been a reduction of 50 per cent in acetylene cost, in addition to time savings.

At the time this article was prepared the New Monarch oxyacetylene plant consisted of one oxygen manifold accommodating ten oxygen tanks, one Oxweld MP-6 portable acetylene generator with a capacity of 50 lb. of carbide and capable of producing 100 cu.ft. of acetylene per hour, 600 ft. of acetylene and oxygen pipe and nine outlets serving the electric, machine, welding, blacksmith and carpenter shops, the engine room and an outside station for cut-

ting rails for collars and bars. Plans called for six additional outlets to serve the boiler plant, turbine room, an outside station at the shaft and the tipple and rescreener, to involve the installation of approximately 500 ft. of additional oxygen and acetylene lines. Also, it is proposed to add another acetylene generator.

If started from scratch and all the equipment purchased new, it is estimated that the installation, with the additions outlined above, but excluding the cost of the proposed extra acetylene generator, would have involved an expenditure of approximately $1,500. Actually, the cost will be considerably less, as the trade-in value of gage equipment, torches, and certain other auxiliaries used with the tank sets offsets a part of the cost of the new equipment which had to be purchased. The fact that this old equipment, while possessing some salvage value, was becoming obsolete and unsatisfactory was another argument for the adoption of the new system. Tank sets, however, still are used underground, and two sets have been retained on the surface for emergency use and for certain jobs where it is inconvenient to tap into the central-system outlets. One Westinghouse and one General Electric motor-generator set take care of arc-welding applications. One of these sets is kept underground for use at the face and also for welding rail joints on main-line track (*Coal Age*, July, 1936, p. 275). Approximately one ton of welding rods for various applications is kept on hand at the mine at all times.

Usual Pressures 50 and 5 Lb.

The acetylene generator and oxygen manifold at New Monarch are installed in stations in the carpenter shop. Ordinarily, oxygen pressure is 50 lb. per square inch, and acetylene 5 lb. per square inch. Acetylene and oxygen lines consist of ¾-in. black pipe, which was carefully cleaned with a hot caustic solution to remove oil or other impurities before installation. Joints are welded where possible and the few threaded joints are treated with litharge. Where the lines are run from one building to another they are buried beneath the frost line and suitable drip catchers to remove water are installed both in these lines and at other points where necessary. Outlets usually are placed on the wall at a convenient height and consist of hose nipples, valves and flashback pots of coal-company manufacture in the acetylene lines. Where the outlets are exposed to freezing temperatures, flashback pots are filled with Prestone.

At points where small torch equipment is used or where close-control welding is done, line-type regulators are installed for close adjustment of pressures. One outlet, in the blacksmith shop, also has hose connections serving an Oxweld cutting unit for shape cutting and switch manufacture. Branches made of small copper tubing also are taken off certain outlets for supplying soldering irons, Prest-O-Lite "5-in-1" outfits and similar equipment. Hoses usually are purchased in 25- and 50-ft. lengths, and in moving from one welding job to another it is only necessary to pull off the hoses, walk them over to the next outlet and connect them onto the nipples.

All sizes of tips up to No. 15 are used at New Monarch, and torch equipment includes aeroplane and combination cutting and welding units. Central-system consumption in November, 1936, was approximately 500 lb. of carbide and 6,600 cu.ft. of oxygen. In addition, 880 cu.ft. of oxygen and 296 cu.ft. of acetylene were purchased for use in tank sets, besides a small consumption of acetylene in miscellaneous uses, such as soldering irons, etc.

WILL THE WHEELS KEEP TURNING NEXT MONTH?

Conference to negotiate a new bituminous wage agreement opened in New York City last month **(see page 134)**

NOTES

From Across the Sea

MANY persons have been bewildered to learn that coal as it becomes more and more divested of its volatile matter by the coalification process increases in its methane content, until anthracite is reached, which perhaps is the most gassy of fuels, wherever found under heavy cover. Dr. L. Coppens, of the Institut National des Mines, Frameries-Paturages, Belgium, describes in the *Annales des Mines de Belgique* some experiments he is making to discover how much methane can be occluded by coal when placed in that gas under 191.77 atmospheres of pressure (2,818 lb. per square inch), approximately the weight of about 2,800 ft. of cover. He concludes that coals of lower rank are inhibited by water and organic bodies from storing as much methane as coals of higher rank in which these inhibitors are absent.

Coalification, he adds, not only provides an adsorptive capacity that binds the methane to the colloidal coal particles but creates a secondary active surface within each particle which supplements the adsorptive power of the primary surface. Humidity appears to have only a subordinate influence which ceases as soon as the coal is saturated, after which more water has no effect.

Under a pressure of 191.77 atmospheres, a low-volatile but gassy coal—and that is not a contradiction in terms—cannot fix more than 961.1 cu.ft. per short ton of methane measured at normal temperature and pressure, to which must be added the free gas in the interstitial spaces, making a maximum total of 1,281.5 cu.ft. Assuming, as this commentator of M. Coppens' remarks does, that a short ton of anthracite occupies 21.5 cu.ft., the volume of the adsorbed gas is 45 times the volume of the coal; and the interstitial gas plus the adsorbed gas .60 times.

However, the figure for the adsorbed gas, says M. Coppens, must be reduced as the rank of the coal decreases and as the temperature rises much above 68 deg. F. Coal samples from the seam being partially degasified give a smaller figure than this, as is natural, but when measuring the methane liberated from the seam during mining, methane is removed with the coal as part of the output and this gas is not considered, so again the true gas content is not obtained. As has been published in *Coal Age*, January, 1936, p. 22, quoting the *Annales des Mines de Belgique*, the latter figure runs up to 2,988 cu.ft. per short ton in the Charleroi Basin, Ten Palms Bed. No wonder M. Coppens hopes to use 400 atmospheres instead of 200. He questions M. Audibert's theory of methane solution.

THAT the quantity of dust floating in rock headings during construction can be greatly reduced by the use in drilling of dust traps, and in loading operations of water sprays, seems amply demonstrated by a paper read by J. I. Graham and F. Lawrence, of the British Colliery Owners' Research Association, at the general meeting of the Institution of Mining Engineers. It is the kind of work our Bureau of Mines belatedly is commencing and probably will do if its appropriations permit.

A modified "sugar-tube method" was used by the authors, in which sugar was replaced by pure potassium-nitrate crystals with two tubes in parallel and other adjustments. Only a few significant results will be given. Unfortunately, the size of the dust was not measured, but the nitrate tubes collected only the very finest of it.

In some instances, to separate the impalpable dust from the relatively coarser material, the dust-laden air, prior to its passage through the nitrate filter, was led to a bottle 4 in. in diameter. This bottle caught practically no dust larger than 40 microns (0.04 mm.), but much of the fine dust was caught, presumably when the dusty air chanced to strike the bottom of the bottle. To determine average concentration of dust, the weight of the dust in the bottle was added to that collected by the nitrate filters, though the analyses, here quoted, of feldspar and free silica include only the dust in the nitrate filters.

Though the facts are not everywhere completely set forth as to number of shifts, speed of advance, wetness or dryness of rock, air saturation, whether drilling is pneumatic or by hand, whether collection was made while shots were fired and heading was being cleared of dust and fumes, whether record includes loading time, manner of sprinkling, etc., the facts show where recorded: (a) the small quantity of rock dust (1) with hand drilling, (2) when dust traps were used, (3) with wet drilling, (4) where the rock was damp, (5) where the rock to be loaded was sprinkled; (b) the large quantity of dust on shooting and shortly thereafter and (c) the non-settlement of dust in passing to the return. The pipe used to connect the face to the filter equipment was a garden hose only ½ in. in diameter, and the air must have traveled fast in it. Probably the hose did not gather up much of the finer dust, as did the 4-in. "bottle," though dust might cling more readily to rubber than to glass, but the filter dust may not be wholly representative of the entire fine-dust product. However, the evidence shows that with proper provisions and conditions the quantity of fine dust is greatly reduced.

COAL in concrete sometimes swells so much that it destroys the bond of the latter, and is objectionable for that reason. British Building Research Bulletin No. 5 declares that the coals which swell unduly and destroy concrete also remove the color from a water solution of the dyestuff

Concentration of Dust in Air During Driving of Rock Headings

Nature of Operation Studied	Dust Concentration Grain per Cubic Foot Nitrate-Tube Plus Bottle Dust	Nitrate-Tube Dust Analysis Per Cent Feldspar Plus Free Silica	Free Silica
Three shifts; average during entire 24 hours with dry pneumatic drilling; no dust trap; heading about 12x8 ft.	0.0350	54.3	44.0
Pneumatic drilling; no dust trap; heading about 9x6½ ft.; advancing 4 yd. per week; rock damp	0.0090	48.1	41.6
Hand drilling; konimeter tests showed practically no dust in drilling but much in loading; heading about 9x6½ ft.; advance about 4 ft. per week	0.0015	36.2	33.0
Pneumatic drilling; old type Hay dust trap (plain bag) heading about 8x6½ ft	0.0043	47.1	41.9
Same heading; dust collected only during blasting and before men returned to face	0.0250	46.8	41.9
Same heading; similar blasting period	0.0950	40.6	39.0
Same heading; but dust taken in return just off heading, apparatus running continuously	0.0050	11.9	10.1
Ventilation good; no dust trap used; dust collector running continuously during 24 hours	0.0040	46.2	41.9
Same heading; dust collection running through drilling shift only and dust collected through 325-mesh gage; men wearing respirators	0.0038	48.2	44.2
Pneumatic drilling; newest Hay dust trap; broken rock sprayed before loading, heading about 8x6½ ft.; damp	0.00034	....	....
Wet drilling; heading about 12x9 ft.; air nearly saturated; advancing about 8 to 9 yd. per week; about 28 shotholes per day using 42 lb. of explosive; sand stemming; ventilation good; 24-in. pipes.			
Drilling	0.00076	43.4	36.6
Loading	0.00054	43.1	31.5
Continuous record	0.00042	19.2	16.8
Pneumatic drilling (dry) with bag filter; tests during drilling, loading and gobbing; ripped 4 ft. of top 5½ to 6 ft. wide; holes usually 6 ft. long; dust collection on return side of work; damp floor; seepage on side of ripping	0.00015 to 0.00060	....	....
Pneumatic drilling (dry); Hay dust trap (old form); double shift	0.0005	25.5	24.8

methylene blue more completely than other coal and, strange to say, absorb less moisture when exposed to moist air than coal that is without unfavorable effect in concrete. Cracks may develop in concrete from one month to many months after pouring. Concrete blocks, slabs or pressed bricks may crack while maturing, but the cracks sometimes may not become visible until a later date. The presence of unburned coal in clinker makes such material of doubtful value.

Failures have been attributed to sulphur aggregates which undergo changes on oxidation, but in practice, declares the bulletin, failure is rarely due to such a cause. Weathering, it adds, will correct the sulphur defect, but the coal still may be unsuited for use in concrete. The clinker or slack can be mixed with fine plaster of paris and normal portland cement and made into a small pat which sets rapidly. If the coal expands, cracks soon become visible, and this will make most unsuitable aggregates apparent.

Another test is to put 25 c.c. of a solution of methylene blue in a glass tube and shake it at half-hour intervals for six hours and to make up a solution of the same with 20 c.c. to a liter of distilled water. After leaving them overnight, if the solution with slack is of stronger color than the other solution, the slack probably will be suitable for use, but if not, or if the color is equal in the two solutions, the slack should not be used for concrete. This test, however, will not detect all unsuitable slacks. Even if partly burned, the slack is likely to swell and injure the concrete. Probably this is why, in New York, objection is taken to all ash for concrete mixes, except that from anthracite workings. Perhaps, using tests such as described, bituminous-coal ash may be found that will make good aggregates for cinder concrete—a selling point which may not have been advanced hitherto.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Orders for all books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

The Relation of the Size of Bituminous Coals to Their Performance on Small Underfeed Stokers. Part I —The Relation of the Size in the Hopper to That Burned in the Retort, by R. A. Sherman and E. R. Kaiser. Bituminous Coal Research, Inc., Washington, D. C. 27 pp., 6x9 in.; paper. Price, 25c.

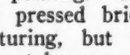
At the Battelle Memorial Institute, studies have been directed to the determination of the most suitable size of coal to use in small underfeed stokers; however, this report deals solely with the breakage caused by a worm feed in passing coal between the feeding hopper and the retort in which the coal is burned. No general agreement had been reached as to the sizes of coal which should be used; some advocated 1½x⅜ in., others 1½x0, 1¼x⅜ and ¾x⅜ in. Other combinations of sizes were favored by some consumers.

Tests have shown that the larger sizes of coal—1-in., ¾-in. and larger—so generally are broken down by the worm feed that the quantity of those sizes reaching the retort is too small to affect the combustion of the coal. Thus the hard Millers Creek coal, with a friability of only 27.0, has its proportion of 1½x1¼-in. coal reduced from 3.3 to 0.7 per cent in its passage. The soft Pocahontas coal, with a friability of 59.5, has its proportion of the same size of coal reduced from 6.2 to 0.9 per cent. Hence, it would seem, says the report, that the top size of coal need not be greater than ¾ in., or at most 1 in.

Elimination of larger sizes, which can be sold as nut, not only will reduce the work spent by the worm feed in crushing these sizes but will decrease the difficulty involved in the segregation of large and small coal in the transfer from mine to consumer's bin, and also, the reviewer would add, reduce still further the noise caused by the operation of the worm feed.

When the larger sizes of coal are included in the feed, more segregation occurs in hopper and retort. Less segregation was found in the stoker retort when using ¾x0-in. coal than when coals with a larger range were used. Oil treatment of the coal did not save the latter from being ground by the worm feed but it did decrease segregation in both hopper and retort. The percentage reduction in the size of the coal in the stoker was found to mirror the hardness of the coal as expressed by Yancey and Zane's friability index.

In determining the size of coal to be used, the relation of size to quality has to be considered. If the minus ⅜- or minus ¼-in. is not so clean as the larger coal, it may for that reason have to be excluded or washed carefully to remove impurities. Other tests are planned to ascertain the relation between size and efficiency in combustion, but the importance of the results obtained in studying the effect of the worm feed seemed worthy of immediate publication.

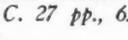


The Inflammation of Coal Dusts: The Effect of the Fineness of the Dust, by T. N. Mason and R. V. Wheeler. Paper No. 95, Safety in Mines Research Board (British). British Library of Information, New York. 16 pp., 6x9¾ in.; paper. Price, 20c.

In experiments made in the 4-ft.-diameter explosion gallery at the Buxton Research Station, it has been found that the flammability of dust increases proportionately with its fineness, whether as determined by its specific surface or by the percentage passing through a 100-mesh screen. Formulas have been prepared based on these ascertainments. The reviewer has not found any reference to the age of the dust. It probably was fresh. Very fine dusts probably oxidize, and the increase would then not be proportional.

Papers Presented at the Second Annual Short Course in Coal Utilization. Engineering Experiment Station, University of Illinois, Urbana, Ill. 163 pp., 5¾x8¾ in., paper. Price, $1.

This booklet contains all the papers presented June 11-13, 1936—a practical symposium of matters interesting to all coal salesmen and to coal men who have to meet market demands—and who do not? As much of the best of these articles have appeared in brief in *Coal Age*, July, 1936, pp. 305-307, a review of them would duplicate much that has already appeared.



Bergtechnisches Taschenwörterbuch, by W. Schulz, H. Louis and E. Goethe. Verlag Glückauf G. m. b. H., Essen, Germany. 80 pp., 4½x6½ in.; cloth. Delivered price, $2.18

Most technical dictionaries cover all the fields but are best in some one field in which the author has been most active and are extremely weak in the mining field with which the author is none too well acquainted. This book is written by a professor in a German mining institution, Clausthal; one in a British mining institution, Newcastle-on-Tyne (the well-known Dr. H. Louis), and a junior German mine inspector, and covers only mining and allied interests. Perhaps it is a little too British, but Americans know most British terms or have glossaries from which they can ferret out such words as have escaped them. Being produced under international auspices, the wordbook has authority back of it. It gives translations both from English to German and from German to English.

OPERATING IDEAS

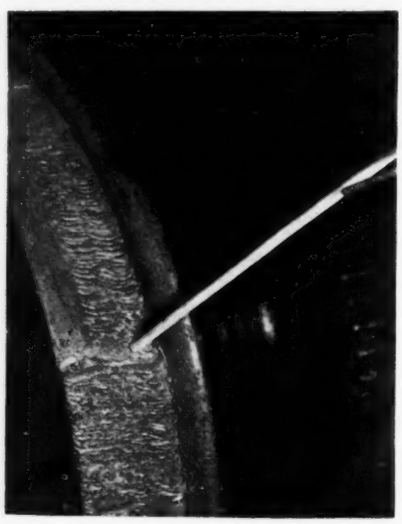
From Production, Electrical and Mechanical Men

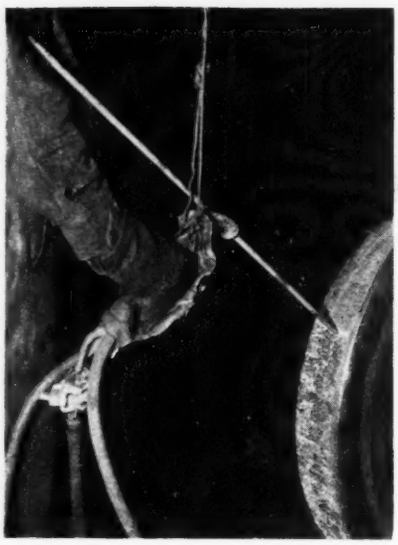
Large Rod and Two Grades Used in Filling Tires

The arcweld tire-filling practice of the Boone County Coal Corporation, Sharples, W. Va., differs in several respects from the practices of other companies. Filler strips are not used, two grades of electrode material compose the two layers, and a ⅜-in.-diameter electrode operated from a water-cooled spring-supported holder is used to speed the application of the lower layer.

The electrode for the bottom contains 1.25 per cent carbon and thus its deposit is too hard to turn in a lathe but shows a high resistance to wear. The upper layer is applied with ¼-in. Fleetweld coated electrode having a carbon content of 0.10 to 0.15 per cent. Apparently a partial mixing of the hard and soft materials takes place when the upper layer is applied —at least the completed job is only soft enough to allow turning in a lathe to proper surface and contour.

The layer in the groove is 1.25 per cent carbon material, but the upper layer is applied with electrode containing 0.10 to 0.15 per cent carbon





Illustrating the water-cooled and spring-supported holder developed for the ⅜-in. electrode

The flange is built up with ¼-in. bare electrode of 0.40 to 0.50 carbon.

Continuous welding with a ⅜-in. rod requires approximately 500 amp. and heats an ordinary electrode holder beyond the temperature a workman can be expected to endure. Therefore a water coil with hose connections was built into the special holder made at the mine shop. This, however, made the weight too great for a man to hold, so a suspension containing a long coil spring was rigged overhead. The operator stands while doing the welding and, because of the spring taking more than the weight, he bears down slightly on the holder instead of carrying its weight.

Experience of the company with this method of filling tires has not proved conclusively as yet that it represents a material saving over buying new tires. However, the tires welded by this method wear as long as new tires and justify the investment in welding equipment and the employment of a welder to be used the balance of the time in salvaging worn and broken parts of all types of equipment.

Hoistman Supervises Demand At Largest Mine

Hoisting engineers at New Orient mine of the Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., supervise the purchased-power demand for the mine and therefore the operating platform of the 4,000-hp. skip hoist has been equipped with the latest available equipment for demand limiting.

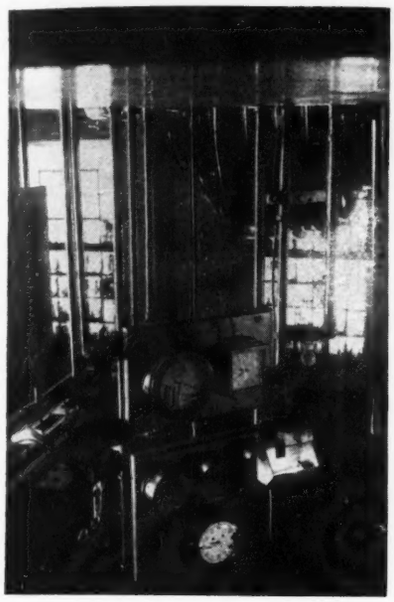
The first demand limiter installed at the mine had the inherent disadvantages of not indicating just how the demand was running as compared to the ideal during the 15-minute period and of allowing the automatic trip contacts to operate even though it was too late in the period to justify interrupting a circuit to reduce power consumption. It also lacked a clock hand to indicate time progress through the period.

These disadvantages were overcome for the most part by attachments and devices worked out and applied by T. L. Garwood, mine engineer. But when the General Electric announced its Type GMS10 demand meter, which combines all the desirable features in one instrument, one of these new ones was installed to replace the several items of original equipment. This new demand meter, which includes limiter features, appears at the right hand on the lower center panel of the accompanying illustration, looking across the top of the operator's platform toward one of the 2,000-hp. hoist motors.

Other equipment which the hoisting engineer has at hand includes an indicating light which is flashed automatically each time at the end of a demand period (as determined by contacts in the power company meter) and a remote control switch with indicating lamp to open and close a circuit feeding the screening plant.

The engineer watches the progress of the meter hand indicating actual demand accumulation compared to the progress of another hand which indicates the steady or ideal accumulation that will result in reaching the predetermined limiting demand at the end of the 15-minute period.

By observation of these hands and of a clock hand the engineer determines if he should continue normal operation of the hoist or if he should cease hoisting until the end of the period. Automatically the meter will interrupt the screening plant when a certain demand is reached within a certain time, unless the hoistman elects to push a button which will prevent that interruption.



Instrument panels on the hoisting engineer's platform include equipment for automatic and manual limiting of the purchased-power demand

Conditions which make it practicable to interrupt either one or both the hoist and screening plant are their excess capacities over the present production of 10,000 tons per 7-hour shift.

★ ★

Wanted—

• From all operating, electrical, mechanical and safety men at the mines descriptions of time- and money-saving or safety-promoting ideas. This department is designed as a clearing house for all such material developed by the men on the firing line. Your contribution is earnestly solicited. Literary skill is not necessary. Just set down your thoughts and send them along, together with any sketches or photographs which may be necessary for complete understanding of the subject in question. The Coal Age editors will do the rest. All ideas submitted receive careful attention, and each one accepted is paid for at the rate of $5 or more on publication.

Sand salvaged by track cleaners was used in building these piers along the Basin Mains of Boissevain mine

Miles of Roof Support Built With Salvaged Track Sand

Sixty per cent of the sand used in building concrete piers for permanent roof supports on main haulways in mines of the Pocahontas Fuel Co. was originally locomotive sand and was salvaged by the track cleaners from along the main haulways. In several of these mines the coal thickness is over 8 ft. Consequently, the piers are high and the volume of concrete was large. Grades are such that the motormen must use considerable sand.

Until four years ago, main haulways were timbered with untreated wood. Thus, timbering continued to be a heavy expense, and, even so, the roof protection was not proof against heavy falls and there was no assurance that a post would not be knocked out if a haulage wreck occurred. To provide safe and uninterrupted operation and to reduce timbering costs in the future, main haulways of five mines have been protected with steel and concrete sets and in most places with lagging of steel or treated timber. The work, which has been under way for four years, was completed late last summer.

Beams supported by the piers consist of two 85-lb. rails, one above the other, with base flanges forming the top and bottom of the improvised I-beam. Two types of construction have been used. In the earlier type the steel and concrete sets were spaced 16 ft. apart and creosoted timber was used as the main lagging. In the later type the spacing was increased to 30 ft. and 85-lb. rail was used as stringers or main lagging.

Two crews of eight men each, one starting at 3 p.m. and the other at 11 p.m., did all of the work. In building the piers, sectional wooden forms were used and the front boards were applied as the space was filled. At least one-half of the pier volume was filled with mine rock (sandstone and hard drawslate).

—◈—

Ditch Cleaner

Regular cleaning of ditches is suggested by Anthony Shacikoski, foreman, Cochran Coal Co., Salina, Pa. Sulphur mud, in Mr. Shacikoski's experience, is a major factor in filling up drainage ditches in mines. This mud deposits quite rapidly. In about three weeks, the deposit on the sides and bottom of a ditch will run from 1 to 2 in. in thickness and in about six months the ditch will be completely filled. In many cases the deposit is hard enough to hold a person up.

Formerly it was necessary to use a pick and shovel in cleaning out this deposit, which led to the development of the chain-drag ditch cleaner shown

This drag facilitates ditch cleaning

in the accompanying illustration. This cleaner consists of two, three or more chains, depending upon the size of the ditch. Cutting picks are twisted into the chains, which are fastened to a suitable cable by which the cleaner can be pulled through the ditch. The larger drags should be equipped with a shoulder harness, Mr. Shacikoski states, and, where possible, a horse or mule should be used. In using the drag it is pulled through the ditch with the current. For good drainage, ditches should be dragged every week.

Rear Conveyor Light Shows Roof

Illumination not only of the car but also a good patch of the roof and the coal going over the rear conveyor of a loading machine is accomplished by the light receptacle shown in the accompanying illustration. This receptacle was developed by the Knox Consolidated Coal Corporation, Bicknell, Ind., especially for the rear conveyor of a Joy loader, and details are furnished by Thomas James, manager, American No. 2 mine.

Fig. 1—Light receptacle welded in place on rear conveyor of loader

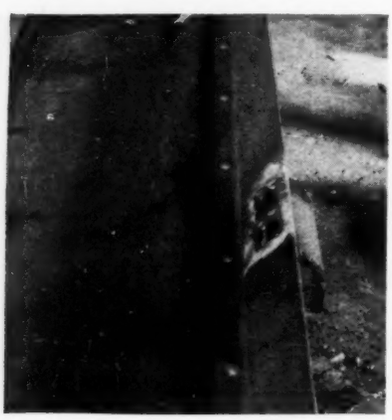


Fig. 2—Showing slots burned in conveyor skirt to permit light to shine into conveyor and against roof

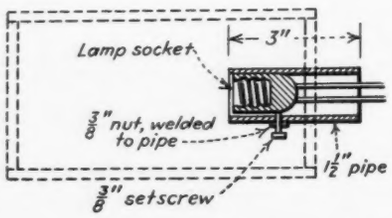


Fig. 3—Details of method of mounting socket in light receptacle

The receptacle is made of a piece of pipe 4 in. in diameter and 8 in. long, which is split lengthwise with a cutting torch and bent out into the shape shown in Figs. 1 and 2. A flat plate is welded into one end, while the bottom is left open. The other end is arranged to accommodate the light socket, which is held in place by a setscrew in a piece of 1½-in.-diameter pipe 3 in. long (Fig. 3). The 1½-in. pipe length is welded into the plate covering the inlet end of the receptacle. The inside of the receptacle is coated with aluminum paint.

When completed, the receptacle is welded onto the rear conveyor of the loading machine. To permit the light to shine into the conveyor and up against the roof, four slots are burned in the conveyor skirt plate (Fig. 2) to match holes previously burned in the receptacle. To complete the installation, a 90-watt 110-volt motor globe is placed in the socket and a corresponding globe is placed in the headlight and the two are connected in series.

Switch Box, Transformer Set Designed for Stripping

Greater convenience in making connections, increased resistance to weather and greater safety are the objectives in the latest design of switch boxes and auxiliary transformer sets used at strip mines operated by the Binkley interests in the Middle West and Southwest. These units were developed by J. W. Daffron, chief electrician, and the electrical department of the Pyramid Coal Corporation, Pinckneyville, Ill. The units shown in the accompanying illustrations were built at Pinckneyville for shipment to the new Bevier (Mo.) operation of the Binkley Mining Co. of Missouri.

Switch boxes (Figs. 1 and 2) are fabricated of welded steel plate and consist of the box proper, mounted on skids made of I-beams, and a removable cover. Each switch box contains three General Electric FK330CB oil switches, one serving the loading shovel (4,000 volts), one the stripping shovel (4,000 volts) and one the 4,000/440-volt auxiliary transformer set supplying power to other pit equipment (440 volts). The auxiliary transformer set usually is placed alongside the switch box, which receives 4,000-volt power through a Trenchlay cable from a pole-line lateral. The Trenchlay cable comes into the switch box through a cable entrance in one corner (Fig. 2). Cables carrying 4,000-volt current are insulated for 5,000 volts and cables carrying 440-volt current are insulated for 600 volts.

Operating handles for the oil switches

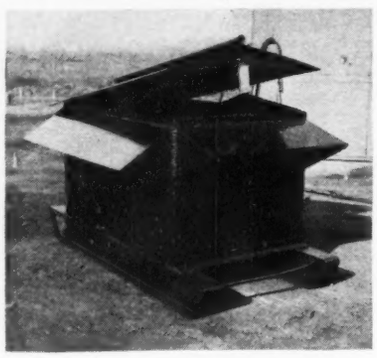


Fig. 1—General view of switch box with cover raised to show its construction

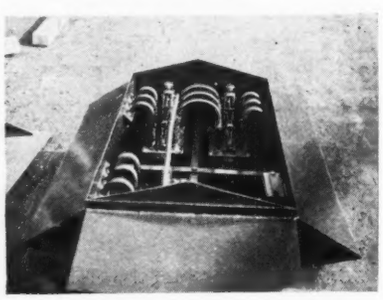


Fig. 2—Interior view of switch box, showing cable entrance, oil switches and outlets for outgoing cables

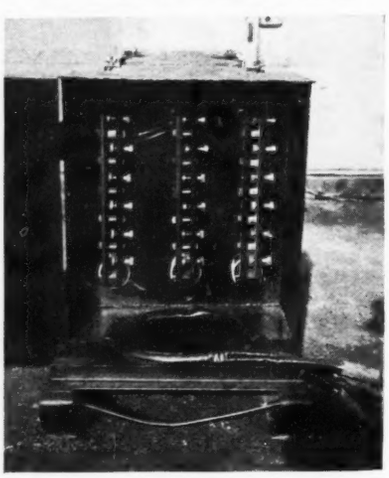


Fig. 3—Busbars on secondary side of auxiliary transformer units permit attachment of six 440-volt trailing cables

Fig. 4—Showing construction of auxiliary transformer unit. Transformers are wired through conduit. The box at the left contains the 4,000-volt fused cutouts, while the one at the right contains the busbars to which the 440-volt railing cables are connected

are brought out under steel-plate canopies at the ends. Similar canopies on the sides protect the cable entrance and the power take-offs from rain, falling material and accidental contact. Each power take-off consists of a group of three Miller cable connectors, which serve the three phases of a cable circuit. An auxiliary connection brought out at the side of the switch box (Fig. 1) permits grounding the unit. Weight of a switch box complete is approximately 500 lb.

Auxiliary transformer sets usually are made in capacities of 45 and 75 kva., the former weighing, complete with oil, about 1,000 lb., and the latter, 1,500-1,600 lb. In addition to the three transformers, which are mounted on skids, a unit also includes a metal box at one end accommodating three primary cutouts with fuses to handle 4,000-volt incoming power and a second box at the opposite end (Fig. 4) containing a set of busbars for attaching cables carrying 440-volt power to auxiliary pit equipment. A short length of cable from the 4,000-volt box permits connecting the transformer unit into one of the switch-box outlets.

As can be seen in Fig. 4, the original insulators for the primary and secondary transformer leads have been discarded and the three transformers wired through conduit between the three transformer cases. This arrangement prevents accidental damage to leads, prevents entrance of moisture, increases safety and makes the unit suitable for all-weather use. In future units, instead of the three separate transformer units, it is planned to mount the three coil assemblies in a common case, thus still further simplifying the construction of a transformer unit.

Fig. 3 is a view of the 440-volt-power take-off box on a transformer unit and shows the busbar units to which trailing cables are connected. One busbar unit is provided for each phase, and each unit consists of a $\frac{3}{8}$x2-in. busbar section paralleled by a steel bar of the same size in which the setscrews used to clamp the trailing cables in place are mounted. Trailing-cable terminals are flat soldered lugs with a capacity of 225 amp., and attachment is made by placing the lugs against the copper busbars and screwing down the setscrews. Six sets of setscrews permit attachment of six trailing cables at one time, the cables going out through the bottom of the box.

Bumps Welded on Rails Reduce Derailments

To reduce the number of derailments at switches, Anthony Shacikoski, superintendent, Cochran Coal Co., Salina, Pa., welds bumps protruding about $\frac{1}{2}$ in. on the ball of the rail at all switch points. Length of the bumps, put on by arc welding, is about 6 in., and their location with respect to the switches is shown in Fig. 1. The bumps thrust the flanges of the wheels away from the points, thus protecting them from wear and also reducing the possibility of derailments, particularly on main haulages where the switches are lined against the trips and especially where cars are being pushed up a heavy grade.

When switches are laid, Mr. Shacikoski states, the track gage should be widened 1 in. or more at the points. This can be done with little effect on the track or on the transit of trips over the switches. In welding a bump on the ball of the rail, a block of carbon is clamped against the web as in Fig. 1 to give the welder an opportunity to build up the bump. Then, while the bump is still hot, it is hammered out smooth and uniform and finished off with a grinder, if necessary.

Another precaution to prevent trouble at switches is a rule that motormen, except in extreme cases, must shut off their sand when going over a switch, even though some momentum is lost during the length of the switch, which seldom is over 10 ft. If sand is used over a switch, there is a tendency for it to adhere to the bottom of the latch, raising it up and causing a gap at the point, as indicated in Fig. 2. On grades where it is necessary to use sand, the underside of the latches is kept well oiled at all times to keep the sand from adhering.

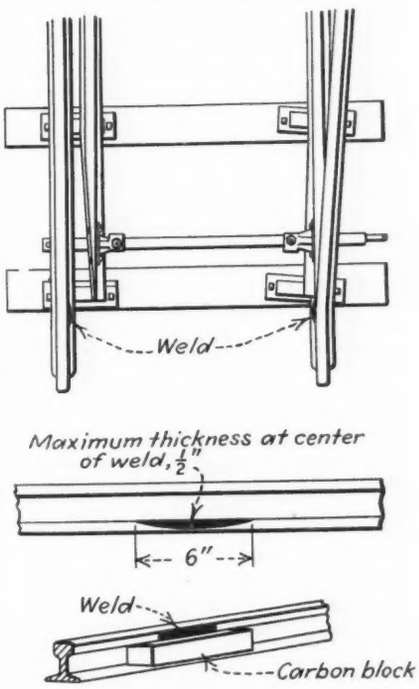


Fig. 1—Top, location of bumps with respect to switch points; center, dimensions of bump, which is welded on the ball of the rail; bottom, showing use of carbon block in welding bump

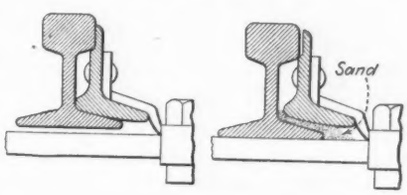


Fig. 2—Left, showing how switch point normally fits against rail and, right, how collection of sand under point raises it and causes an open switch

WORD FROM THE FIELD

West Virginia License Bill Opposed by Operators

West Virginia operators are strongly opposing a measure in the Legislature which would require all miners in that State to obtain a certificate from the examining board to be eligible for employment. The bill, which has received a favorable recommendation from a House committee, would become effective April 1, 1938. William Blizzard, vice-president of District 17, United Mine Workers, is supporting the measure. The producers told the Senate Mines Committee that the bill would abridge freedom of contract.

Brooks Fleming, Jr., president, Northern West Virginia Subdivisional Coal Operators' Association, presented a resolution for his group which contended that the proposal would inevitably result to an appreciable degree in the surrender of management of coal properties to those who have no investment therein; there is no clause governing revocation of certificates, hence an inefficient miner might obtain employment at another operation after discharge; production might be hampered inasmuch as an operator might not be able to get additional certified men as quickly as needed.

Other operators' representatives appearing in opposition to the bill included Gilbert Smith, New River Coal Operators' Association; Jesse V. Sullivan, secretary, West Virginia Coal Association; J. J. Ardigo, secretary, Coal Operators' Association of the Williamson Field, and H. A. McPallister, Logan Coal Operators' Association.

Earle Names Inspectors

Six deputy secretaries of mines to serve in the capacity of mine inspectors in anthracite districts where there are vacancies were named Feb. 3 and 5 by Governor Earle of Pennsylvania. The appointees are: John J. Grace, Minersville, who has been serving with the State Department of Mines on special assignment; James F. Munley, Archbald, foreman, Jermyn colliery, Hudson Coal Co.; James Boner, Freeland; James J. Shrober, Minersville; and Ralph A. Dietzler, Tremont.

Bootleg Commission Named

Governor Earle of Pennsylvania named his commission of five to study the anthracite industry, with a view to eliminating bootleg mining, on Feb. 10 and the State Senate confirmed the

appointments on Feb. 16. W. Jett Lauck, economist, of Washington, D. C., who has been associated with the United Mine Workers at various times, is chairman of the commission, with these associates: William R. Lynett, Scranton (Pa.) newspaper publisher; Dr. James W. Angell, professor of economics, Columbia University; Morris L. Ernst, New York, attorney; and Harrison Hoblitzelle, president, General Steel Castings Co.

Keeping Step With Coal Demand

Bituminous Production

	1937 (1,000 Tons)	1936* (1,000 Tons)
Jan. 2	8,730	8,288
Jan. 9	10,420	9,095
Jan. 16	10,131	8,673
Jan. 23	9,377	8,385
Jan. 30	8,516	9,044
Feb. 6	9,805	10,179
Feb. 13	10,065	10,458
Total to Feb. 13	59,480	59,967
Month of Jan	**39,610**	**39,330**

Anthracite Production

Jan. 2	842	1,220
Jan. 9	1,142	1,300
Jan. 16	952	1,017
Jan. 23	836	1,050
Jan. 30	992	1,543
Feb. 6	972	1,692
Feb. 13	581	1,621
Total to Feb. 13	5,978	8,646
Month of Jan	**4,025**	**5,333**

* Outputs of these two columns are for the weeks corresponding to those in 1937, although these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

	(Thousands of Net Tons) Jan. 1 1937	Dec. 1 1936	Jan. 1 1936
Electric power utilities	7,223	6,859	6,250
Byproduct ovens	8,535	8,146	5,559
Steel and rolling mills	1,264	1,103	954
Railroads (Class 1)	6,809	5,138	5,589
Other industrials*	11,168	10,422	10,365
Total	34,999	31,668	28,717

Bituminous Coal Consumption

	(Thousands of Net Tons) Jan. 1 1937	Dec. 1 1936	Jan. 1 1936
Electric power utilities	3,647	3,506	3,221
Byproduct ovens	6,242	5,811	4,850
Steel and rolling mills	1,284	1,196	1,117
Railroads (Class 1)	8,238	7,665	7,390
Other industrials	12,462	11,372	9,982
Total	31,873	29,550	26,560

* Includes beehive ovens, coal-gas retorts and cement mills.

Committees Work Out Plans For A.M.C. Convention

Plans for the 14th annual convention of Practical Coal Operating Men and National Exposition of Coal-Mining Equipment, to be held at Cincinnati, Ohio, May 17-20, under the auspices of the American Mining Congress, are rapidly shaping up as the various committees in charge of the affair swing into action. A number of meetings of these committees were held at Pittsburgh, Pa., last month and more are in prospect. Sectional meetings of the general program committee, headed by C. E. Cowan, vice-president, Monroe Coal Mining Co., were followed by a general meeting of the committee on Feb. 16. All indications point to a record-breaking May attendance.

Tentative program plans call for the presentation of groups of papers on the following topics: Face preparation, power problems, safety, surface preparation, haulage and hoisting, mechanical loading, roof action and control, drainage, ventilation, maintenance and supplies, management and labor relations, strip mining, research, and mining-extension courses. Following the system which worked out so successfully last year, a subcommittee of the committee on arrangements will see that all meetings start promptly and are run on schedule. H. B. Husband, manager of mines, Chesapeake & Ohio Ry., is chairman of this subcommittee.

Eight Subcommittees Named

Eight subcommittees have been named to expedite the work of the committee on arrangements, which is headed up by W. W. Dartnell, manager of mines, Valley Camp Coal Co., as national chairman. W. W. Rodgers, Westinghouse Electric & Manufacturing Co., is chairman of the subcommittee on publicity; John C. Cosgrove, president, West Virginia Coal & Coke Corporation, and J. F. Coakley, Thomas A. Edison, are joint chairmen of the subcommittee on entertainment; Newell G. Alford, Eavenson & Alford, and W. H. Cordes, American Steel & Wire Co., will head the welcoming subcommittee; W. D. "Bill" Turnbull, Westinghouse Electric & Manufacturing Co., again will guide the activities of the subcommittee on entertainment; Bruce G. Shotton, Hendrick Manufacturing Co., and L. W. Shugg, General Electric Co., will be in charge of the exposition subcommittee as chairman and director of exhibits, respectively; A. W. Fisher, McGraw-Hill Publishing Co., is chairman of the subcom-

mittee on contests, and Mrs. A. E. Bendelari will again be head of the subcommittee in charge of entertainment for the ladies.

Demands for space for exhibits are taxing the available facilities. Many of the manufacturers are planning larger exhibits than in 1936 and others not in the exposition last year are clamoring for space.

$200,000 in Prizes Offered For Welding Papers

Prizes totaling $200,000 for papers on the application of welding to manufacture and construction of new equipment have been offered by the James F. Lincoln Arc Welding Foundation. A total of 446 awards will be made for winning contributions falling in 11 main and 44 subclassifications of welding work. The grand prize will be $13,700; first prizes in the main classifications will be $3,000 each, and in the subclassifications, $700 each. Subject matter must treat either of redesign of existing machines or structures, new design of machines or structures, or organizing and conducting a welding service. The contest closes June 1, 1938. Complete details and rules may be secured from A. F. Davis, secretary of the foundation, Box 5728, Cleveland, Ohio.

The foundation, established last December by the Lincoln Electric Co. and named in honor of its president, was organized to encourage and stimulate scientific interest, study, research and education in the development of the arc-welding industry through the advance in the knowledge of design and practical application of the arc-welding process, and to provide for the payment of awards, by prizes, to those persons who by reason of the excellence of their papers upon the subject may be selected to receive such awards. Activities of the foundation will be under the direction of Dr. E. E. Dreese, chairman, department of electrical engineering, Ohio State University, with W. B. Stewart, member of the Cleveland bar, and H. R. Harris, vice-president, Central United Bank, Cleveland, as co-trustees.

Illinois Gas Tax Sought

A tax of 5c. per thousand feet on natural gas to eliminate unfair competition with Illinois coal is again sought in two bills now before the Illinois Legislature. The measures, which were introduced by Senator James O. Monroe, of Collinsville, and Representative Paul Powell, of Vienna, are identical with the Monroe and Lewis bills presented in 1935, which failed of passage (*Coal Age*, May, 1935, p. 228; June, 1935, p. 274). The latest measures are sponsored by the Illinois Reciprocal Trade Association.

Midwinter A.I.M.E. Sessions Feature Health, Water and Mining Topics

WATER and safety problems bulked large at the coal sessions of the 147th meeting of the American Institute of Mining and Metallurgical Engineers, New York City, Feb. 15-19. Mechanization, ground movement, size segregation, and chemical and physical aids in classification also had a place on the program, while a preconvention meeting, Feb. 14, discussed engineering education and allied topics. Erskine Ramsay, chairman of the board, Alabama By-Products Corporation, formally received the William Lawrence Saunders gold medal for "distinguished achievement in mining" and George S. Rice, chief mining engineer, U. S. Bureau of Mines, his certificate of honorary membership in the institute.

G. S. Rice
Honorary Member A.I.M.E.

More than $3,000,000 has been spent by federal agencies in sealing abandoned mines, declared Abel Wolman, chairman, subcommittee on water sources, National Resources Committee, at the Feb. 15 meeting. About one-half of the work regarded as likely to produce results justifying the expenditures has been completed. Another $5,000,000 could be spent sealing worked-out sections of active mines. Operators, however, should consider seriously whether it is advisable to have the government render this service because what government aids it tends at once in a degree to control, and eventually the control is likely to become rigorous and burdensome.

No further legislation should be attempted, insisted A. B. Crichton, president, Johnstown Coal & Coke Co., until the problem of reducing acidification is better understood. Ever since the courts rendered their decisions in the *Indian Creek case*, it has been established that a clean stream may not be polluted by opening a mine if any interests thereby will be jeopardized. Several mines, for this reason, have not been opened.

In the West, said Eugene McAuliffe, president, Union Pacific Coal Co., who presided, the government had no acidification problem, but it had extinguished crop fires and filled shafts. He urged coal companies to act to the extent of their ability in meeting the pollution problem and to cooperate with all reasonable government agencies.

Although the exact mechanism of the oxidation of pyrite is not known, three fundamental reactions are commonly accepted, stated R. D. Leitch, associate chemical engineer, U. S. Bureau of Mines. These are:

$$2\ FeS_2 + 7O_2 + 2\ H_2O \rightarrow 2\ FeSO_4 + 2\ H_2SO_4$$

$$4\ FeSO_4 + 2\ H_2SO_4 + O_2 \rightarrow 2\ Fe_2(SO_4)_3 + 2H_2O$$

$$Fe_2(SO_4)_3 + 6\ H_2O \rightarrow 2\ Fe(OH)_3 + 3\ H_2SO_4$$

In the third reaction, ferric sulphate hydrolyzes—that is, reacts with water alone, to form ferric hydroxide and sulphuric acid. These are the simplest reactions, but it is not definitely known whether the iron salts have the simple compositions indicated.

Dr. Wolman prefaced the reading of a paper by his assistant, George L. Hall, on "Relationship Between Acid Mine Water and Other Forms of Stream Pollution," with a statement of his own belief that the acidification of sewage was not a complete corrective of the evil effects of fecal matter. Absence of *Bacillus coli* in the stream waters might testify to the absence of harmful bacteria; the hydrogen-ion concentration might show that the water was acid and yet there might be viruses that would cause enteric diseases. So it would not serve the best interests of either coal men or sanitation authorities to rely on the acid waters to correct the harmful effects of sewage. Mr. Hall's paper asserted that not only is acid mine water competent to prevent domestic sewage from consuming dissolved oxygen and setting up putrefaction in streams, but it has a similar effect on less important industrial effluents, such as those from tanneries, pulp-and-paper mills, distilleries, canneries, milk plants, and dye and textile works.

Acid may only inhibit putrefaction without destroying bacteria, so putrefaction is not prevented but merely delayed until neutralization occurs lower down the stream. Moreover, mild acidification, said R. Dawson Hall, engineering editor, *Coal Age*, is not as effective as mild alkalinization in preventing putrefaction. Food processors, for example, had found that they did well in their work to lean to the alkaline side of neutrality.

The tremendous acid load reaching

the streams in West Virginia, said E. S. Tisdale, division of sanitary engineering, State Department of Health, in a paper read by Mr. Leitch at the afternoon session, presided over by Newell G. Alford, Eavenson & Alford, costs plants along the Monongahela, from the West Virginia State line to McKeesport, Pa., $801,000 annually. A definite limit exists as to the work that should be done to reduce acidification of mine effluents, declared E. W. Lyon, regional consultant, Public Health Service, Pittsburgh, Pa.

Methods by which the WPA projects under the supervision of the PHS studies and classifies as to operating status and acid output the mines of Alabama, Indiana, Kentucky, Maryland, Ohio, Pennsylvania and West Virginia were described in a paper written by R. V. Whitman, associate director, Sealing Abandoned Coal Mines, Greensburg, Pa., and read by W. R. Chedsey, professor of mining, Pennsylvania State College. Pennsylvania alone has 7,000 mines, active, marginal or abandoned, covering 12,000 square miles in 22 counties, said Mr. Chedsey.

Principles of Sealing

In sealing mines, many other considerations have to be kept in mind besides a free flow of water and the exclusion of air from the mine, remarked G. E. Ziegler, division engineer, Mine Sealing Project, New Philadelphia, Ohio. The mouth of the mine must be prevented from closing from falls of roof. For this reason the opening must be timbered, especially near the surface. Moreover, though water when acid will not freeze, care must be taken against the time that the water will become neutral. To avoid freezing, the water is conveyed from the mine by a buried pipe in some instances and discharged to a sunken reservoir. Making the reservoir wider at the top than at the bottom will cause the ice in forming to lift. Hence, many of the reservoirs have been made the shape of an inverted truncated cone.

Every flood is accompanied by an increase in the quantity of water and in the quantity of acid discharged, making it appear that the work has received a definite setback, stated C. L. Chapman, assistant director, SACM, Fairmont, W. Va. To get a true evaluation of progress, it is necessary to plot results on the basis of a full year, setting against every quarter the average result of the present quarter with the three preceding quarters. About one-fifth of the results of sealing are disconcerting. It is necessary to segregate these for special treatment and to find out what, if anything, should be done to keep them in line.

Most of the true surface breaks, declared Mr. Alford, are in the abandoned work, but, added Mr. Rice, if longwall took the place of room-and-pillar methods the roof would not contain so many open cracks. The breaks in these do not heal so readily and water is carried by them to the mines. Some mines in Ohio, said H. E. Nold, professor of mining engineering, Ohio State University, have as many as 250 surface openings and are so near the surface that it is almost impossible to seal them.

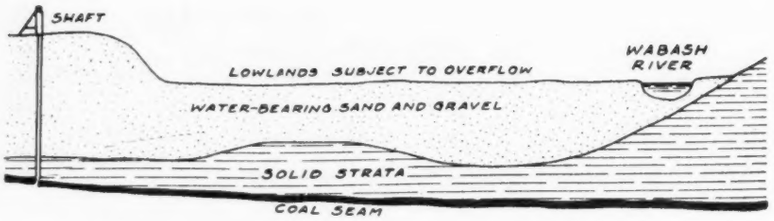


Fig. 1—Cross-section over Saxton mine, Terre Haute, Ind.

Costs Versus Savings

From an engineering standpoint the primary problem in mechanization lies in balancing the capital charges involved in the change against savings in production cost and against possible increase or decrease in sales price, said Paul Weir, consulting engineer, Chicago, speaking at the joint session of the Coal Division with the Health and Safety in Mines Committee on Feb. 16, presided over by G. R. Delamater, W. S. Tyler Co. A decided trend toward general modernization of coal mines had resulted from higher wage rates. Lower operating costs must come through improvements in methods and greater efficiency.

Investment in loading machines represents less than one-half and at times as little as one-fourth of the total cost of complete mechanization of a mine, yet, Mr. Weir asserted, invariably all operations are planned and built around the loading machine. From a loading standpoint the ideal condition is to have the coal fall as "loose" as that found in a retail dealer's yard. It results in highest rate of loading, lowest maintenance cost on loading machines and minimum breakdowns, but the extent to which an operator may go to achieve this end is largely a matter of experience, because the breaking of coal reduces its market value.

Mechanization did not result in increased power needs at the Union Pacific mines, said Mr. McAuliffe; kilowatt-hours per ton produced fell rather than increased. The shift toward factory production methods had made plain to the management that operating deficiencies such as mine-car shortage and lack of voltage, which the management formerly believed were laid on labor, had fallen and would always fall on the industry and were reflected already in higher rates for all contract labor.

At the Saxton and Dresser mines, near Terre Haute, Ind., and at the Hegeler mine, near Danville, Ill., water conditions make it necessary to seal off worked-out sections of the mine, and much over a hundred bulkheads have been installed in each, said S. M. Cassidy, speaking for himself and John A. Garcia, Allen & Garcia Co. Saxton and Dresser mines are under the flood plain of the Wabash Valley, with a relatively thin solid cover of gray slate or sandy shale overlaid by 100 ft. or more of water-bearing sand and gravel, a portion of which constitutes the bed of the river (see Fig. 1). At the Hegeler mine, 70 ft. above the coal seam, is a 4-ft. water-bearing gravel bed; above the gravel bed is about 30 ft. of clay and subsoil. Bad roof is found in all three mines, which are developed by room methods confined within definite panels by heavy pillars.

At the Saxton mine, related Mr. Cassidy, hitchings for bulkheads are now excavated entirely by cutting and shearing machinery and at much lower cost than by former methods, in which air-driven punchers and concrete breakers were used. The new bulkhead gives twice as much roof support and doubles the distance along ribs and floor through which water must pass when it tries to seep into the mine. Plan, side and front views of this bulkhead are shown in Fig. 2. In panels driven under solid top with thickness down to 30 ft. or even less, another type of bulkhead with an emergency flood gate has been developed to protect the mine from possible inrush of water.

Dresser Plug-Form Bulkheads

Bulkhead practice at the Dresser mine (see *Coal Age*, September, 1935, p. 373) varies somewhat in dimensions and method of installation from that followed at Saxton. Though Dresser has thicker average cover, the main roof is not as strong and water breaks occur if less than 60 ft. of solid top is available. Pressures, moreover, had reached 84 lb. per square inch with river at flood stage. Hegeler mine bulkheads are planned to stand a normal pressure of about 40 lb. per square inch (Fig. 3) and are constructed to take full advantage of the swelling nature of the clay floor, which becomes impervious, so that it cannot be washed out. Moist clay is tamped at the top of the bulkheads to seal them, as its use dry cracked the concrete as soon as water was absorbed.

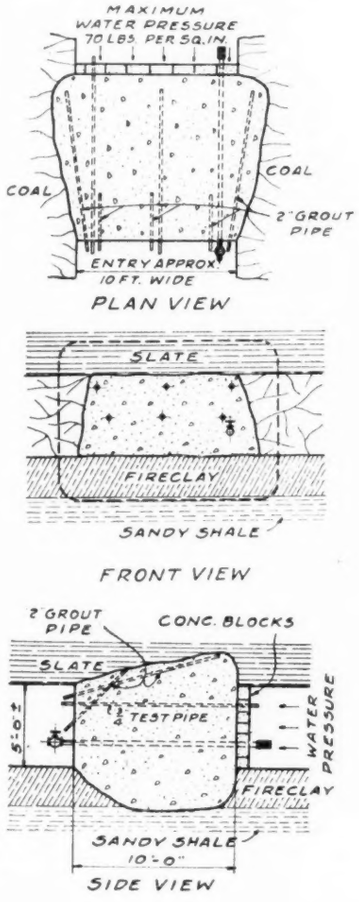
A wedged-shape manhole, said Mr. Cassidy, is provided in the bulkhead, so that the pressure side may be tamped. On completion of the sealing, this manhole is plugged with cement. Average cost of four bulkheads at the Saxton mine in 1933 was $549.97 each, and the cost of two under the modern method of installation in 1935 was $294.95 each, with material costing about 54

per cent of the total and labor about 40 per cent.

If proper consideration has not been given to drainage, stated W. A. Bishop, chief engineer, Pocahontas Fuel Co., in describing the recently completed 18.6 mile tunnel of that company (see *Coal Age*, January, 1937, p. 3), uncontrollable production costs will exist through the entire life of the property, usually getting worse as the mine grows old and more overburden is broken. Safety practices of the Consolidation Coal Co. were reviewed by F. E. Bedale, safety engineer of the company (see *Coal Age*, October, 1930, p. 604; November, 1936, p. 529).

Closely sized coal will not segregate, nor will particles of about the same specific gravity. Segregation in a stream of moving solids is similar to settlement of solids in a liquid, said D. R. Mitchell, assistant professor of mining and metallurgical engineering, University of Illinois, in the afternoon session Feb. 16, at which Mr. Hesse presided. Where, at the university, 1¼- or 1½-in. raw screenings are dumped by a carrier to one side of a bin, the finest of the coal is found along that side of the bin and the coarser material on the other side with gradations in size from one side to the other.

Fig. 2—Standard for main bulkheads at Saxton mine



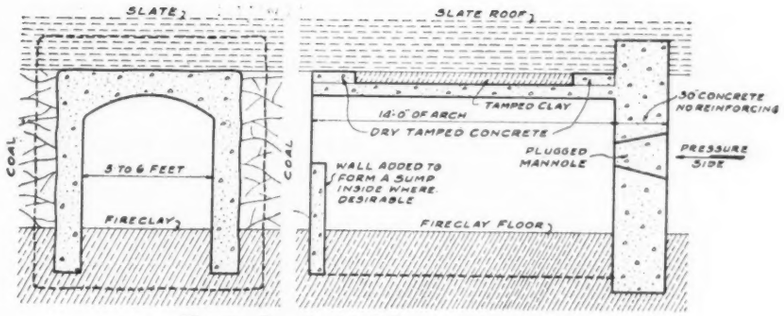
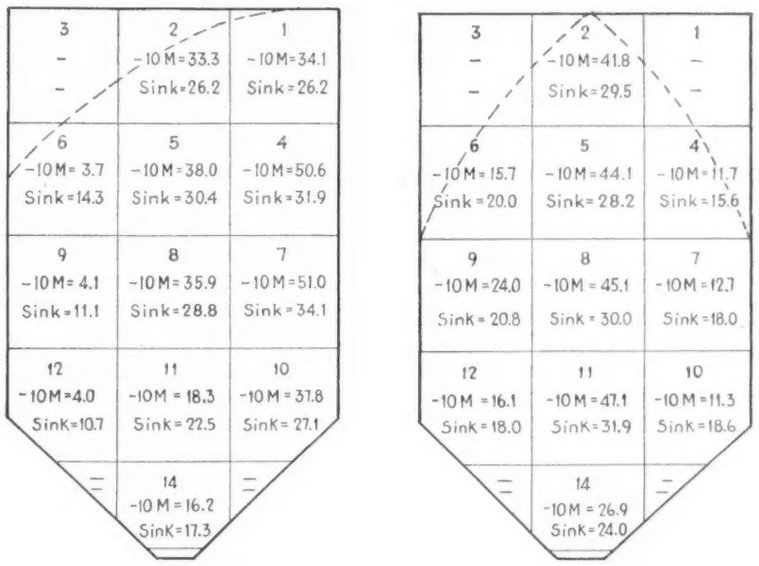


Fig. 3—Standard bulkhead at Hegeler mine



Figs. 4 and 5—Size and impurity distribution in bins loaded at side and in center

When a bin was filled from a point at the top center, Dr. Mitchell stated, quoting Holmes, fine coal settled at the center, forming a sort of core. When the bottom of the bin was opened the fine coal in the center of the bin ran out along a narrow channel extending up to the top of the coal. Into the funnel thus created from the surface of the coal to the bottom the coarse coal at the edges of the bin rolled down and crowded out the fine coal because of the greater activity of the former.

Fig. 4 shows the result of one of a series of tests made at the University of Illinois, the coal being placed in the bin with a shovel in such a way as to simulate the discharge of a bucket conveyor. The coal segregated most both by size and specific gravity where the coal was delivered near the side of the bin. Average sink at 1.60 specific gravity was 18 per cent and average of the minus 10-mesh material was 20 per cent, yet in Fig. 4 showing coal dumped at the side of the bin, the sink in one section is as high as 34.1 per cent and as low as 10.7 in another, and the minus 10-mesh as high as 51 per cent in one section and as low as 3.7 in another. Studies were made where the coal was put in a bin in layers so as to prevent segregation and it was found that in this instance on withdrawal from the bin the coal segregated negligibly.

Dr. Mitchell found that, in a conical pile built up from a central point of discharge, the coal on the bottom in the center of the pile had 31.8 per cent sink, whereas the sides and top had 14.0 to 19.6 per cent sink. In the bottom center of the cone, 50 per cent was minus 10-mesh and at the sides from 10.4 to 23.7 per cent. The center was everywhere finer and dirtier than the exterior of the pile. Segregation, he said, may cause inefficient cleaning, screening and sampling with blinding of screens. It also interferes with efficient operation of both industrial and domestic stokers.

Iron sulphide contained in sulphur balls from coal strata oxidizes ten times as fast as synthetic "or naturally occurring" marcasite and pyrite in the presence of oxygen-saturated water, declared S. P. Burke, consulting engineer, speaking for himself and Richard Downs, teaching fellow, Massachusetts Institute of Technology. Con-

sequently the purer sulphide crystals were not used in the experiments they made to ascertain the speed of oxygenation of pyrite. A sulphur ball was cut into cubes with Carborundum wheels. Subsequent experiments with cubes from other sulphur balls showed no essential difference in reactivity or chemical behavior. The ball consisted of 90 per cent iron sulpide plus slightly over 2 per cent of additional sulphur plus about 7.5 per cent of material, probably primarily bituminous matter, and a trace of silicate.

As long, said Dr. Burke, as any flow of oxygen was maintained through the solution as reaction progressed, neither the rate at which oxygen was supplied nor its concentration or partial pressure had any detectable effect on the rate of oxidation. But, when oxygen was absent, the loss was greatly reduced, and this loss may have been due solely to loss of ferrous sulphate that was present in the pores before the particular test was made and not due to ferrous sulphate made during the test.

Index of refraction has been found by Hoffman and Jenker to be indicative of coal rank and the Leitz slit microphotometer can be used to determine the different reflection intensity, declared a joint paper by L. C. McCabe, assistant geologist, Illinois Geological Survey, and T. T. Quirke, professor of geology, University of Illinois. Many determinations were made by the authors of the angle of maximum polarization of light by the polished surfaces of vitrains and thus they derived their refractive indexes. These indexes, they found, increased somewhat regularly with B.t.u. of moisture-and-mineral-matter free coal, but the measurements reached only two decimals, which hardly satisfies the needs of those who would compute the rank of coal thereby.

Silicosis Vs. Explosions

Many more persons perhaps have lost their lives from the silent and almost unobserved operation of silicosis than have died from mine explosions, commented Dan Harrington, U. S. Bureau of Mines, at the health and safety in mines session, Feb. 18, at which J. J. Forbes, of the same bureau, presided. It seemed futile, Mr. Harrington added, to try to determine the quantity of dust particles that allowably might be in suspension in a working place, as the quantity would depend on the percentage of silica, the temperature of the working place, the energy put forth in the work, the condition of the lungs of the person working in the dust and his breathing habits.

Any quantity that might be labeled an allowable quantity should be carefully defined as "tentative," and the method of collection of the sample should be carefully specified, for different methods in the hands of competent samplers gave different results. The best way to meet dust problems is not by respirators, however excellent they may be. They are to be regarded as a further precaution after all steps have been taken. Water should be used to drench down the face after all efforts have been provided to keep down the dust before it is raised.

In checking favorably Mr. Harrington's conclusions, A. J. Lanza, assistant medical director, Metropolitan Life Insurance Co., said that definitions of allowable dust were undesirable. The carbon-dioxide percentage for buildings set up as a standard had proved utterly unsuitable and excessive and not at all the criterion for adequate ventilation. He hoped no such false criteria would be made for allowable dust concentrations. Silicosis is not disabling unless it is accompanied by infection, and its occurrence may be hastened by other pulmonary diseases. Payment of compensation should not be made on a diagnosis of the disease but for and in proportion to the disability which has resulted from it and its infectional complications.

At the International Nickel Co.'s mines, declared H. J. Mutz, every care was being taken to prevent silicosis, though the rock contained less than 0.5 per cent of free silica. That company arranged to clean the air out completely in the 90 minutes between shifts. Ontario favored the konimeter because, with it, dust counts could be made of only such dust as was fine enough to be dangerous, said George Norman, chemist, Ontario Mining Association. It is easy to take samples with the konimeter, but only one or two dust counts can be made in a day. Silicosis compensation had not proved as costly as had been feared, asserted George Bateman, secretary, Ontario Mining Association, despite the severity of the Ontario laws.

Extensions have been made in Harlan County, Kentucky, of the longwall methods undertaken to prevent bumps, said J. F. Bryson, director of safety, Harlan County Coal Operators' Association, speaking at the Ground Movement and Subsidence Committee meeting, Feb. 17, at which Mr. Plank presided. No bumps have occurred or lives been lost since the change was made. In places 100-lb. bags of mine refuse were being used for packs, each bag containing about 80 lb. of refuse. Good results had been obtained.

The paper by H. P. Greenwald and E. R. Maize, U. S. Bureau of Mines, on convergence in a western Pennsylvania room-and-pillar mine, covered much the same ground as that presented at the meeting of the Coal Mining Institute of America (*Coal Age*, January, 1937, p. 32) with some further detail of new work added. In some cases convergence measurements had been made at an immense number of points in the mine, using not convergence recorders but taking measurements by a sliding rod every half hour.

Pillars should be smaller on top than at points below, then the pressure will be better distributed. Mushrooming the top of a pillar, so much advocated by metal miners in the past, put much of the burden on the mushroom extensions and on the pillar edge; thus spalling resulted, said P. B. Bucky, school of mines, Columbia University. This fact had been demonstrated by photography of strained translucent facsimiles of roof, coal and floor, in which light is polarized by the strain.

PERMISSIBLE PLATES ISSUED

THREE approvals of permissible equipment were issued by the U. S. Bureau of Mines in January, as follows:

Goodman Manufacturing Co.: Type 260-B loading machine; three motors, 50, 4 and 1½ h.p., 500 volts, d.c.; Approval 277-A; Jan. 7.

Sullivan Machinery Co.: Type 7-B shortwall mining machine; 50-h.p. motor, 220-440 volts, a.c.; Approvals 311 and 311A; Jan. 21.

Westinghouse Electric & Manufacturing Co.: Westinghouse-Baldwin locomotive; Approval 1528; Jan. 25.

★ ★

Air Hygiene Group Elects

Additions to the board of trustees of the Air Hygiene Foundation, at its annual meeting, held Feb. 9 at the Mellon Institute, Pittsburgh, Pa., included the following: Daniel Harrington, chief, Health and Safety Branch, U. S. Bureau of Mines; Joseph Dilworth, assistant to the president, Westinghouse Electric & Manufacturing Co.; Andrew Fletcher, vice-president, St. Joseph Lead Co.; E. A. Hults, vice-president, Mathieson Alkali Works. These trustees were reelected: C. E. Lesher, executive vice-president, Pittsburgh Coal Co.; Dr. R. R. Sayers, U. S. Public Health Service; William P. Yant, Mine Safety Appliances Co.; V. P. Ahearn, National Industrial Sand Association; Vandiver Brown, Johns-Manville Corporation, and A. W. Sherwood, Owens-Illinois Glass Co.

Officers reelected are: chairman, Roger A. Hitchins, president, National Refractories Co.; vice-chairman, H. A. Schultz, United States Steel Corporation; treasurer, Dr. B. D. Saklatwalla, United States Rustless Steel & Iron Corporation; secretary, Lloyd T. Williams.

St. Louis Has Smoke Law

An anti-smoke ordinance passed by the Board of Aldermen of St. Louis Mo., on Feb. 5 was signed on Feb. 11 by Mayor Bernard F. Dickmann. The new law is now in full force and effect except for Sec. 18, which provides that all coal 2 in. in diameter or less containing in excess of 12 per cent ash or 2 per cent sulphur shall be

washed so that it will contain not more than the specified quantity of ash. This section also requires that coal larger than 2 in. in diameter shall be hand picked or otherwise cleaned so that the visible impurities will not exceed ¾ of 1 per cent per ton. Sec. 18 will become effective July 1. The new ordinance sets up a smoke commissioner at $6,000 per year, a deputy commissioner and eight inspectors.

In signing the bill, Mayor Dickmann ignored a telegraphic request from Governor Horner of Illinois that action on the measure be delayed. There also was vigorous opposition from many Illinois operators, miners and municipalities on the ground that the process would be ineffective, very costly and would throw thousands of miners out of work. Clarence G. Stiehl, president, St. Clair-Madison Counties (Illinois) Coal Operators' Association, said his organization would institute legal action to prevent enforcement of the new law.

—⊹—

New Preparation Facilities

BUCK RUN COAL CO., Buck Run, Pa.: contract closed with Wilmot Engineering Co. for installation of Hydrotator equipment consisting of four units to prepare 50 tons of anthracite nut, 35 tons of pea, 25 tons of buckwheat, and 25 tons of rice per hour; represents replacements; to be completed May 1.

COLONY COAL CO., Rock Springs, Wyo.: contract closed with McNally-Pittsburg Manufacturing Corporation for complete four-track tipple with rescreening facilities and bins for loading two additional sizes, with box-car loading on three tracks; picking tables for all prepared sizes; capacity, 225 tons per hour; to be completed Aug. 1.

GLEN ALDEN COAL CO., Maxwell colliery, Ashley, Pa.: contract awarded Koppers-Rheolaveur Co. for 8-ft. Menzies cone separator to clean pea coal; capacity, 70 tons per hour; completed.

HICKORY GROVE COAL MINING CORPORATION, Jasonville, Ind.: contract closed with Jeffrey Mfg. Co. for seven-track washery with picking facilities; minus 4-in. coal to be washed in a three-compartment Jeffrey-Baum automatic jig with accessory dewatering and water-clarification facilities; crusher provided to allow washing of larger sizes if desired; sizing of smalls by Jeffrey-Traylor electric vibrating screens; input capacity, 300 tons per hour.

KEMMERER COAL CO., Kemmerer, Wyo.: contract closed with Jeffrey Mfg. Co. for tipple equipped with dumping facilities including belt conveyor to plant; auxiliaries comprise shaking screens, swiveling picking tables, loading booms for either box-car or gondola loading, mixing conveyor and electric vibrating rescreen; storage conveyors to be used with loading booms to allow continuous operation of tipple while loading box cars; capacity, 200 tons per hour.

PENNSYLVANIA WATER & POWER CO., Holtwood (Pa.) operations: contract awarded Deister Concentrator Co. for two No. 7 Deister-Overstrom "Diagonal-Deck" coal-washing tables for handling No. 4 buckwheat river coal; completed.

PITTSBURGH COAL CO., Champion No. 1 cleaning plant, McDonald, Pa.: contract closed with Koppers-Rheolaveur Co. for Type AR-1 Carpenter centrifugal dryer for drying minus ⅜-in. washed coal.

POND CREEK POCAHONTAS CO., No. 1 mine, Bartley, W. Va.: contract awarded Kanawha Mfg. Co. for vibrating screens for ¼-in. separation at 300 tons per hour; tandem Menzies hydroseparator for cleaning ¼x½-in. nut and pea at rate of 115 tons per hour; washed coal to be dewatered and separated on vibrating screen into ¼x¾-in. pea and ¾x1½-in. nut; pea and nut to be boom-loaded or mixed with slack.

POND CREEK POCAHONTAS CO., No. 4 mine, Bartley, W. Va.: contract awarded Kanawha Mfg. Co. for cleaning equipment for pea and nut coal with tandem Menzies hydroseparator; capacity, 80 tons of ¼x1½-in. coal per hour.

SUNLIGHT COAL CO., Boonville, Ind.: contract awarded the Stephens-Adamson Mfg. Co. for additional bins and conveying equipment for refusal disposal and for direct loading of ¼x2-in. nut coal on separate tracks.

WEIRTON COAL CO., Isabella mine, Isabella, Pa.: contract closed with Koppers-Rheolaveur Co. for three Type AR-4 Carpenter centrifugal dryers for drying minus ⅜-in. washed coal.

Coming Meetings

- Appanoose County Coal Operators' Association: annual meeting, April 1, Centerville, Iowa.
- Utah Coal Operators' Association: annual meeting, April 7, Salt Lake City, Utah.
- Virginia Coal Operators' Association: annual meeting, April 10, Norton, Va.
- Ohio Coal Control Association: annual meeting, April 19, Cleveland, Ohio.
- Central Pennsylvania Coal Producers' Association: annual meeting, April 20, Altoona, Pa.
- American Mining Congress: annual convention and exposition, May 17-20, Music Hall, Cincinnati, Ohio.
- Fourth short course in coal utilization: May 25-27, University of Illinois, Urbana, Ill.
- Mine Inspectors' Institute of America: annual convention, June 21-23, Deshler-Wallick Hotel, Columbus, Ohio.
- Mining Society of Nova Scotia: annual meeting, June 21-23, at Nova Scotian, Halifax, N. S.

Floods Curtail Coal Output

Bituminous production was curtailed between 3,000,000 and 4,000,000 tons, it is estimated, as the result of the recent Ohio River Valley floods. The greatest losses were chargeable to interruptions in transportation service, particularly westbound movement via Ohio River crossings from the Appalachian region. Southern Indiana, parts of southern Illinois and western Kentucky also suffered. Complete restoration of normal transportation had not been effected late in February.

Direct water damage to mines was greatest in western Kentucky and Saline County, Illinois. Operations of the Flat Creek Coal Co., Blue Valley Coal Corporation and Newcoal Corporation in the Madisonville (Ky.) area were inundated and the mine of Meador, Young & Holt Co. at Clay, Ky., was flooded by water entering through old workings. Pumping at all of these operations was to start as soon the flood subsided. The No. 3 mine of the Sahara Coal Co., in Saline County, was flooded out and may not be recovered. If dewatering is undertaken, it probably will be several months before the operation is restored to service. Several other shaft operations in the county were protected against serious damage by building up sand bags 4 to 7 ft. or more around the shaft openings. Water also hampered some of the stripping operations there and in southern Indiana.

Inability of the railroads to furnish a full car supply and the damage to trackage cut Harlan County (Kentucky) output approximately 550,000 tons between Jan. 21 and Feb. 13. The Hazard field lost approximately 382,500 tons during the same period, with car supply the middle of February still only 50 to 60 per cent of normal. Losses in the Big Sandy-Elkhorn field are estimated at 250,000 tons; an embargo on the Chesapeake & Ohio lines was lifted Feb. 15. The transportation breakdown cost the Kanawha (West Virginia) field approximately 613,500 tons. Movement over Norfolk & Western lines west of Ironton was embargoed from Jan. 24 to Feb. 4 and the ensuing blockade of loads cut sharply into car supply when traffic was restored. The Pocahontas district, it is conservatively estimated, lost 750,000 tons production as a result of flood interference with transportation.

—⊹—

Association Reorganized

The Coal Control Association of Western Pennsylvania has been reorganized as the Western Pennsylvania Coal Operators' Association. Officers are: president, J. D. A. Morrow, president, Pittsburgh Coal Co.; vice-president, R. E. Jamison, vice-president, Jamison Coal Corporation; secretary-treasurer, Byron H. Canon. Headquarters are in the Oliver Building, Pittsburgh, Pa.

Appalachian Wage Negotiations Start; Conference Bars Mid-West Fields

NEGOTIATIONS for a new Appalachian wage agreement to become effective April 1 opened at the Hotel Biltmore, New York City, Feb. 17 with the presentation of the miners' proposals for a 30-hour week, increased pay and a guaranteed annual minimum income, and the formal introduction of the operators' offer of last December (*Coal Age*, January, 1937, p. 36) to continue existing rates unchanged but increase the work-week to 40 hours. The only point of agreement in the two proposals was that the new contract run for two years. Both proposals were referred to a joint scale committee which met Feb. 18 and 19 and then recessed until Feb. 24. Prior to the scale-committee deliberations, however, the operator members of the conference rejected a motion made by the miners to admit Illinois, Indiana and Iowa to the Appalachian wage-making group.

Threats of suspension of operations were decried by spokesmen for both sides at the opening session. After complimenting operators and miners for the manner in which the present agreement has been carried out, John L. Lewis, president, United Mine Workers, voiced the hope that the conference might be successful in working out a new agreement without the loss of any working time in the interest of miners, operators and the public.

Favor Early Agreement

This view was heartily indorsed by Charles O'Neill, president, United Eastern Coal Sales Corporation, and chairman of the operators' negotiating committee. The producers too, he said, had come to the conference with the hope and the expectation of making a new wage contract. The public, he declared, is entitled to know at an early date whether the conference will be successful and whether there will be a suspension on April 1.

In presenting the miners' proposals, Philip Murray, vice-president of the union, stated that they were offered in all sincerity as the expression of the hopes and aspirations of the workers in the industry. They represented the conclusions of the union after considering over 1,200 resolutions submitted by local unions at the last biennial convention of the United Mine Workers. These proposals were:

1. A six-hour day, five-day week, for all employees except workers engaged in the transportation of men and coal and outside workers engaged in the dumping, handling and preparation of coal and the manufacture of coke. Outside workers may work not to exceed 30 minutes per day over the six hours, but "all time worked in excess of six hours shall be considered as overtime."

2. A flat increase of 15c. per ton in the combined cutting-and-loading rate; an increase of 50c. per day to all day-wage men with proportionate increases to monthly men; 25c. per ton increase in pick-mining rates; 20 per cent increase in yardage and deadwork. "Increases on conveyors and mechanical loading machines and for all strip mines shall be made the equivalent of the increases granted to hand loaders."

3. All overtime to be paid for at the rate of one and one-half with double time for Sundays and holidays.

4. "A minimum of 200 days employment each year shall be guaranteed to all mine workers employed in and around the mines. Day men shall be paid the regular rates of pay provided in district wage agreements for each day less than the guaranteed 200, and tonnage men shall be paid a basic $6 day rate for each day less than the guaranteed 200."

5. Two weeks' vacation with pay.

6. Consideration shall be given to the elimination of all inter- and intra-district differentials.

7. Creation of a joint commission on mechanized mining "with the object in view of establishing uniformity of rates of pay and conditions of employment in and between districts, and alleviating the problem of the displacement of men. The work of this commission shall be completed and reported to an Appalachian joint conference which shall be convened for the purpose of making such adjustments as in the judgment of the conference are necessary. Such a conference shall be convened not later than March 1, 1938."

8. District conferences, to be held concurrently with the Appalachian conference, shall consider "all wage-scale resolutions affecting local working conditions and rules."

9. The new agreement shall be for a two-year period ending March 31, 1939.

Characterizing the miners' proposals as "amazing" and "utterly impossible" to grant, Mr. O'Neill asserted that labor costs in the Appalachian field had been increased 52c. per ton, or 71.2 per cent, since the fall of 1933. Figures compiled by the Bureau of Labor Statistics, he declared, showed that the average hourly earnings of bituminous miners since July, 1933, had gone up from 45.5c. to 80c.—an increase of 75.8 per cent. If the comparison is made on the basis of the average weekly earnings "as of July, 1933, and October, 1935, the increase amounted to 94.3 per cent." The wage increases alone, he estimated, would add at least $140,000,000 per year to costs in the Appalachian wage area.

Mr. O'Neill would venture no guess as to the costs involved in the proposals for a guaranteed minimum and for district readjustments. Mr. Murray, in his appeal for the miners' proposals, stated that the average annual wages now received by the workers was $1,077 gross and $920 net. Government studies, he added, put the annual minimum subsistence requirements at $1,500, while the plea for a guarantee of 200 days meant only $1,200 per year.

Duncan C. Kennedy, secretary, Kanawha Coal Operators' Association, was reelected chairman of the joint conference; Thomas Kennedy, secretary-treasurer, United Mine Workers, was again chosen secretary; Stanley C. Higgins, secretary, New River Coal Operators' Association, assistant secretary, and John G. Hoffstot, president, Lincoln Gas Coal Co., sergeant-at-arms.

The members of the joint scale committee are: J. D. A. Morrow, president, Pittsburgh Coal Co.; L. E. Woods, president Crystal Block Coal & Coke Co.; L. T. Putman, general

An Off-the-Record Discussion

Charles O'Neill, spokesman for the operators; Philip Murray, vice-president, and John L. Lewis, president, U.M.W., hold an impromptu conference at the Biltmore, where Appalachian wage negotiators meet.

superintendent, Raleigh-Wyoming Mining Co.; D. A. Reed, general manager of operations, Consolidation Coal Co.; P. C. Thomas, vice-president, Koppers Coal Co.; Ezra Van Horn, executive vice-president, Ohio Coal Control Association; M. L. Garvey, Pocahontas Fuel Co.; Messrs. O'Neill, Lewis, Murray and Thomas Kennedy, and the following district presidents of the United Mine Workers: James Mark, District 2; Frank Hughes, District 3; William Hynes, District 4; P. T. Fagan, District 5; John Owens, District 6; John T. Jones, District 16; Van A. Bittner, District 17; William Turnblazer, District 19; William Burch, District 24; John Saxton, District 28; Samuel Caddy, District 30; and Frank Miley, District 31.

Personal Notes

RICHARD BERRY has been appointed superintendent of New Lafferty mine of the Hanna Coal Co., Lafferty, Ohio.

ELWOOD BOOTH has been made superintendent at Killarney mine of the Lillybrook Coal Co., Killarney, W. Va.

ED BREWER has been appointed foreman at Laing No. 2 mine of the Wyatt Coal Co., Eskdale, W. Va.

J. ALLAN BROOKES has been named superintendent of No. 1 mine of the Pursglove Coal Mining Co., Pursglove, W. Va.

DAVID P. BROWN, recently a resident engineer with the Alabama Highway Department, prior to which he was in the employ of the Tennessee Coal, Iron and Railroad Co., has been made assistant superintendent of Wylam No. 8 mine of T. C. & I., Wylam, Ala.

FRED BURNETT, formerly superintendent of Black Arrow No. 18 mine of the Peabody Coal Co., West Frankfort, Ill., has been made superintendent of the No. 47 mine, at Harco, Ill.

BARNEY CALVERT has been made foreman at Laing No. 1 mine of the Wyatt Coal Co., Laing, W. Va.

JOHN M. CARMODY, formerly editor of *Coal Age*, has been nominated by President Roosevelt to succeed Morris L. Cooke as administrator of the Rural Electrification Administration. Mr. Carmody, who had been deputy administrator under Mr. Cooke, had previously been transferred from the National Mediation Board to the National Labor Relations Board.

CLAUDE CLARK has been appointed superintendent of the Puritan Coal Corporation, Puritan Mines, W. Va.

H. B. DAVIES has been made general foreman of the Rich Run mine of the Elk River Coal & Lumber Co., Widen, W. Va.

EARL EWING has been named foreman at the Sliding Hill mine of the Hartford Coal Co., Hartford, W. Va.

Dr. Helmuth H. Schrenk

MILTON H. FIES, vice-president and general manager, DeBardeleben Coal Corporation, Birmingham, Ala., has been elected to the board of directors of the Warrior River Terminal Co. He succeeds A. B. Aldridge, vice-president, Stith Coal Co., resigned.

CHARLES GREGORY, for many years foreman at mine No. 8 of the Union Pacific Coal Co., Rock Springs, Wyo., has been granted leave of absence because of ill health. His place has been taken by J. R. MANN, recently foreman of Hanna No. 4 mine.

GEORGE HARPER has been appointed foreman at Edwight No. 4 mine of the Raleigh-Wyoming Mining Co., Edwight, W. Va.

J. B. HUGHES has been named foreman of Hanna No. 4 mine of the Union Pacific Coal Co., Hanna, Wyo., vice J. R. MANN, transferred.

L. A. KELLY, formerly foreman at Blossburg "E" mine of the Brookside-Pratt Mining Co., Blossburg, Ala., has been appointed superintendent of the Blossburg division, vice WILL MURRAY, promoted.

WILLIAM M. LACEY has been appointed superintendent of the Edgewater mine of the Tennessee Coal, Iron & Railroad Co., vice George P. Brown, resigned.

C. J. LA MENA, formerly associated with the Allen & Garcia Co., Chicago, has become assistant to the president and general manager of the Hinsdale Manufacturing Co., Chicago.

T. A. MARSH, Central division engineer for the Iron Fireman Manufacturing Co., has been elected chairman of the executive committee, fuels division, American Society of Mechanical Engineers.

D. W. MARTIN has been made general superintendent and JAMES SCOTT as superintendent of the Wyatt Coal Co., operating in Kanawha County, West Virginia.

PETER F. MCLINDEN, Fairmont, has been appointed truck mine inspector of the West Virginia Department of Mines.

P. D. MCMURRER has resigned as safety director of the West Virginia Department of Mines to become assistant mining engineer for the American Mining Congress.

M. M. MOSER has been appointed vice-president in charge of operations of the United Electric Coal Cos., with headquarters in Chicago.

WILL MURRAY, superintendent of the Blossburg division of the Brookside-Pratt Mining Co., Blossburg, Ala., has been named to the newly created position of general safety inspector for all operations of the company.

H. P. NUTTER has been made foreman at the Hemlock mine, Laurel Smokeless Coal Co., Kathryn, W. Va.

OSCAR F. OSTBY, president of Independent Anthracite Coals, Inc., has been appointed director of markets for the Stevens Coal Co., anthracite producer with operations at Shamokin, Pa. He will retain his position at the head of Independent Anthracite Coals, Inc., for the present.

THOMAS O'TOOLE has been named superintendent of the Central Pocahontas Coal Co., Welch, W. Va.

WOODY PRICE has been appointed general foreman of Kingston Nos. 2, 3, 4, 5 and 9 mines of the Kingston Pocahontas Coal Co., Kingston, W. Va.

R. B. RENNER, mechanical engineer, Jeffrey Manufacturing Co., has been made chairman of the executive committee, materials handling division, Am. Society of Mechanical Engineers.

H. C. ROSKY has been named foreman at Ethel No. 2 mine of the Chilton Block Co., Ethel, W. Va.

JAMES ROWE has been made company inspector at the Lillybrook and Killarney mines of the Lillybrook Coal Co., in Raleigh County, W. Va.

SETH SANDRIDGE has been appointed general superintendent by the Maryland New River Coal Co., operating in Fayette County, West Virginia.

DR. HELMUTH H. SCHRENK has been appointed chief chemist of the health division of the U. S. Bureau of Mines, with headquarters at the Pittsburgh Experiment Station. He succeeds William P. Yant, resigned. Dr. Schrenk attended the University of Wisconsin, where he specialized in chemistry and toxicology and received a Ph. D. degree. He was assistant in the department of pharmacology of the University of Wisconsin and assistant toxicologist of Wisconsin, 1923-28. In the latter year he joined the staff of the health laboratory section, Pittsburgh Experiment Station, and has successively held the positions of associate toxicologist; chemist in charge of the toxicological and biochemical laboratory; and chemist, gas section.

CHARLES SHAFER has been made as-

sistant superintendent of Edgewater mine of the Tennessee Coal, Iron & Railroad Co. He was formerly in the engineering department.

R. E. SWECKER has been made superintendent of the Maiden mine of the Kelleys Creek Colliery Co., Maidsville, W. Va.

RAY VICKERS has been appointed general mine foreman at Dorothy Gordon No. 2 mine of the Detroit Mining Co., Gordon, W. Va.

ARTHUR WALDMAN, formerly with the Philadelphia & Reading Coal & Iron Co., has been named assistant superintendent of the Hamilton mine of the Tennessee Coal, Iron & Railroad Co., Pratt City, Ala.

W. H. WALSH has been appointed deputy coal mine inspector of Wyoming to succeed Andrew Hamilton, who has become associated with the Union Pacific Coal Co.

E. J. WEIMER, formerly general manager, Snow Hill Coal Corporation, operating in Vigo County, Indiana, has been appointed superintendent of the Dun Glen mine of the Hanna Coal Co., in eastern Ohio.

W. P. YOUNG has been elected vice-president and general manager, in charge of operations, of the Bell & Zoller Coal & Mining Co. and the Centralia Coal Co., operating in southern Illinois. Mr. Young, formerly superintendent of the company's Crescent properties, at Peoria, succeeds Paul Weir, retired. J. M. JOHNSTON, heretofore preparation manager, has been appointed assistant general manager.

JOSEPH BIERER, West Virginia State mine inspector, was elected president of the Monongalia County Chapter of the Joseph A. Holmes Safety Association at its annual meeting, Feb. 17. Other officers chosen were: vice-presidents, JOSEPH H. STEWART, Pursglove Coal Mining Co.; JAMES F. CROCKETT, general manager, National Fuel Co.; W. W. DARTNELL, Kellys Creek Colliery Co.; JAMES TROTTER, Davis-Wilson Coal Co.; secretary-treasurer, J. ALLAN BROOKES, Pursglove Coal Mining Co.; director of publicity, ROBERT D. BRADFORD, Rosedale Coal Co.

GEORGE P. FITZ, general manager, Ajax Coal Co., was reelected president of the Hazard Coal Operators' Association at its annual meeting. Other officers renamed are: vice-president, D. T. PRITCHARD, president, Algoma Block Coal Co.; secretary-treasurer, A. E. SILCOTT.

GEORGE H. MORSE, vice-president and general manager, Union Collieries Co., was reelected president of the Coal Operators' Association of the Thick Vein Freeport Seam of Pennsylvania at its annual meeting. Other officers renamed are: vice-president, W. P. VANCE, mining engineer, Butler Consolidated Coal Co.; treasurer, GEORGE C. TREVORROW, mining engineer, Harwick Coal & Coke Co.; secretary, C. W. GIBBS.

Silicosis Conference Files Its Report On Best Ways to Handle Disease

REPORTS of the various committees of the National Silicosis Conference were presented at its final meeting, Feb. 3, held at the U. S. Department of Labor, Washington, D. C. Though the silicosis problem, declared Secretary Frances Perkins, was regarded at first as a controversial matter, careful study in conference had separated things true from those untrue. Many contrary views were held, and some committees had found themselves not entirely in harmony as to the action to be taken, but the conferees had labored industriously and had presented well-considered reports.

Silica is not the only harmful dust encountered in industry, declared R. R. Sayers, U. S. Public Health Service, speaking for the Committee on Prevention of Silicosis Thorugh Medical Control. Silicosis, he said, may be defined as "chronic disease due to the breathing of air containing silica (SiO_2), characterized anatomically by generalized fibrotic changes and the development of military nodulation [nodules like millet seeds] in both lungs, and clinically by shortness of breath, decreased chest expansion, lessened capacity for work, absence of fever, increased susceptibility to tuberculosis (some or all of which may be present) and by characteristic roentgenological findings."

Clinical and laboratory studies, Dr. Sayers declared, indicate that the harm is due primarily to chemical action, though silica also may damage the lungs mechanically. A few silicosis cases have developed in as short a time as 1½ years, but these were due to excessive concentrations of extremely fine, almost pure, silica. Present knowledge indicates that some individuals are more susceptible than others, not from birth but by reason of acquired conditions. Pulmonary infection, especially tuberculosis, may be considered the major predisposing factor. Bronchial asthma, bronchiectasis (dilation of the larger bronchial tubes), emphysema (distended or ruptured air cells) and heart disfunctions may increase the tendency to silicosis.

Fine Dust Most Harmful

To be harmful, the dust particles, said Dr. Sayers, must be less than 10 microns in the greatest dimension; those most frequently found are under 3 microns. Based on clinical studies, five to ten million particles per cubic foot is the greatest dust concentration that is safe and permissible in Pennsylvania anthracite mines when the dust contains 35 per cent of silica; with 13 per cent of silica the same limiting concentration will rise to between ten and fifteen million particles per cubic foot; with 5 per cent of silica, as much as 50 million particles will be the maximum safe dust concentration.

Other substances which may be associated with silica in the dust may be inert diluents merely reducing the quantity of silica inhaled, but others may remove the fine silica from the atmosphere and a few may perhaps accelerate its action. Most insoluble dusts inhaled with silica alter the anatomical form of the silicotic lesion, depending on the type and quantity of adulterant dust.

Dust Standards Lacking

At the present time, no universal regulatory standard of permissible dust can be determined. Good practice requires that concentrations of highly siliceous dust be kept at five million particles per cubic foot or less. The arithmetical product obtained by multiplying the proportion of free silica to total dust by the total dust count should be kept under five million, Dr. Sayers suggested, though this will not apply to dust containing less than 5 per cent of free silica. A man may be diagnosed as having silicosis, and yet not be disabled. A complete diagnosis should state whether a decreased capacity for work is evident, and, if so, its cause and degree. It should also state if there is evidence of pulmonary infection, latent or active, and the organism by which it probably is caused.

Increased costs for preventive or compensatory measures may have marked economic effects upon the relative position of competing industries or units. This is particularly true as to inter-industry competition, such as that between coal and oil for fuel purposes, declared V. P. Ahearn, National Sand and Gravel Association, speaking for the majority of the Committee on Economic, Legal and Insurance Phases of the Silicosis Problem. A similar difficulty occurs between States having a marked disparity in their statutory requirements as to dust-control measures and compensation.

If silicosis has not advanced beyond the early stage and is not complicated by other pulmonary affections and if the exposure is of fifteen years' or more duration, employees should continue in employment at the same operation, particularly if deleterious dust concentration has been reduced to a non-injurious degree. In a similar case in which the exposure has been for less than five years the employees should not be subjected to further exposure and should either be protected by adequate devices or be placed in an occupation free from dust. When an employee has had intermediate exposure and has arrived at the early stages of silicosis, his case should be decided on its merits. When an employee is discharged from work because of non-disabling silicosis and

suffers a proved wage loss he should receive compensation based on that loss, which should not exceed a year's compensation if the worker has been employed by a given employer for three months or more.

Silicosis which does not cause wage loss should not be compensated, declared the majority of the committee, but compensation should be given for partial disability, as is customary after injury from accident. "When an employer operates under conditions which bring the dust count to or below a concentration of silica dust which is determined by appropriate State authority to be safe so far as producing a disabling silicosis is concerned, he should under no circumstances be held liable for a subsequent disabling silicosis . . . Accrued liability, at least in part, should be recognized as a public liability, and the finding of any statutory requirement to meet this liability should not be entirely a direct assessment upon the industries of employees involved."

Speaking for J. P. Frey, American Federation of Labor, and the minority of the committee, R. J. Watt, Massachusetts Federation of Labor, declared prevention the first step; the financing of coverage of accrued liability for the silicosis already embedded in the lungs of tens of thousands of wage earners was the second, and the third is rehabilitation of those who cannot safely continue in their present trade.

Waste of Insurance Money

Complete adoption of any real preventive problem should not be brought about by private insurance companies, for silicosis-stricken workmen should receive the full share of premiums paid by employers on their behalf. In many states compensated workers are receiving only about 30c. out of the premium dollar, while fees of lawyers, physicians and charges of insurance administration, etc., absorb the other 70c., and from this 30c. must be deducted the sums paid by employees to lawyers and doctors in contested cases. "We are unalterably opposed to a provision for such [physical] examinations unless and until the profit motive in compensation insurance is eliminated . . . and until the worker and his dependents are adequately taken care of through hospitalization, rehabilitation, reeducation, etc.," said the minority report.

"Employees disabled from silicosis," declared L. M. Walling, Labor Commissioner of Rhode Island, speaking for the majority of the Committee on Regulatory and Administrative Phases of the Silicosis Problem, "are in principle entitled to the same amount of compensation as those disabled as a result of accidental injury, but, recognizing the problem of accumulated exposure, the committee recommends an immediate cash benefit payment of 50 per cent of the amount of the statutory cash benefit for accidental injury and death payable at the time the act takes effect, wtih a monthly percentage increase reaching 100 per cent within a period of from five to seven years from the date of enactment of the statute . . . A dismissal payment should be made to an employee separated from his employment because of silicosis." Such payment should be made without prejudice to the employee's right to recover the rest of his compensation, if his claim is filed within the statutory period, which should not be less than two years.

Traversing the statement of the regulatory and administrative committee, D. D. Carmel, speaking for M. P. Durkin, director, Illinois Department of Labor, objected to the provision "that the findings of a medical advisory board should be final and that the board should have power to appoint impartial examiners to examine claimants to resolve all doubtful medical points in connection with the claim." The opinions of all such examiners, he thought, should be subjected to question in cross examination.

Obituary

GEORGE W. RIGGS, general sales manager of the Uniontown (Pa.) headquarters of the Mine Safety Appliances Co. and for many years eminent in mine safety engineering, died Jan. 28 of a heart attack. He had distinguished himself in rescue work in many mine disasters in Pennsylvania and West Virginia during the last twenty years and had at various times been president of the National Mine Rescue Association, Coal Mining Institute of America and the Mine Rescue Veterans' Association.

HERMAN BRYANT, 64, general superintendent, Ingle Coal Co., Oakland City, Ind., died Feb. 11 of pneumonia. He had been in the employ of the Ingle company for thirty years.

RALPH SPRENKLE, general manager and purchasing agent for the Butler Consolidated Coal Co., Wildwood, Pa., died Feb. 20, aged 47.

★ ★

STOKER SALES REGISTER 80 PER CENT GAIN

SALES of mechanical stokers in December last totaled 5,822 units, according to statistics furnished the U. S. Bureau of the Census by 108 manufacturers. This compares with sales of 9,011 units in the preceding month and 3,663 in December, 1935. Figures for the twelve months of 1936 show that 86,080 units of all types and sizes were sold, compared with 47,926 in the preceding year, a gain of nearly 80 per cent. Residential-type stokers accounted for 76,376 units in this total.

H. M. Chance Passes

Dr. Henry Martyn Chance, 81, well-known mining engineer and geologist, died Feb. 19 at his home in Philadelphia, Pa. He was especially well known in Pennsylvania bituminous and anthracite fields, where he introduced the sand-flotation preparation process, which was invented by his son, the late Thomas M. Chance. Graduated from the University of Pennsylvania in 1874, he became a member of the second Pennsylvania geological survey and for ten years worked as assistant State geologist in iron, coal and oil fields of western Pennsylvania. Becoming interested in mine ventilation, he studied medicine, obtaining an M.D. degree. His geological work took him to North Carolina, Arkansas, Mexico and Wyoming, discovering and developing coal lands in the last-named State. He had been engaged in consultant work in Philadelphia since 1890.

Industrial Notes

LINK-BELT Co. has appointed Erwin A. Wendell district sales manager at St. Louis, Mo., with headquarters at 317 North Eleventh St. Mr. Wendell, succeeds Howard L. Purden, who has been assigned to sales responsibilities in Chicago territory.

J. GUY GRIFFITH Co., representative of the Viking Mfg. Co. in Pennsylvania, will move about April 1 to new offices in the Union Trust Building, Pittsburgh, Pa.

JOHN A. ROEBLING'S SONS Co. has appointed Arthur E. Gaynor as manager of its New York branch, succeeding W. P. Bowman, deceased.

MEDART Co. has opened a new district sales office in the Dierks Building, Kansas City, Mo., with W. A. Crooks in charge.

NEW YORK BELTING & PACKING Co. announces the appointment of Crerar, Adams & Co., Chicago, and Charles B. Scott Co., Scranton, Pa., as distributors of its mechanical rubber goods in their respective territories.

PITTSBURGH TESTING LABORATORY has elected C. M. Houck vice-president, succeeding A. R. Ellis, recently elected president. Formerly manager of the inspection division. Mr. Houck has been connected with the laboratory for the last six years.

MINE SAFETY APPLIANCES Co., Pittsburgh, Pa., is adding a new four-story building, 65x177 ft., to its plant. The new structure will be ready for occupancy about April 1. M.S.A. has taken over the business of the safety department of Drummond, McCall & Co., Ltd., Montreal, Canada, and has formed the Mine Safety Appliances Co. of Canada, Ltd., to market its products, with R. Morris in charge. R. M. McCall will represent the company in Nova Scotia.

Report Revised Guffey Bill to House; Operators Unable to Agree

WASHINGTON, D. C.—Feb. 25.—The Ways and Means Committee of the House favorably reported the new Guffey-Vinson bituminous coal control bill today following conferences beginning Feb. 15, in the course of which several changes were made in the measure. Still another measure, introduced in the House by Representative Casey, of Massachusetts (H.R. 3666), called "The Coal Trade Act of 1937," would control the marketing of anthracite as well as bituminous coal. The measure was referred to the Committee on Interstate and Foreign Commerce and, although its sponsor has held several conferences with operators in its interest, there has been no further action nor has a companion measure been presented in the Senate. The operators' efforts to formulate legislation for coal control (*Coal Age*, January, p. 29; February, p. 95) came to naught when, at a meeting of nearly 150 producers or their representatives, held Feb. 4 at the Biltmore Hotel, New York, there was such a wide difference of opinion that the conference adjourned *sine die*.

Among the revised provisions of the Guffey-Vinson measure, the most significant perhaps were in the tax features, the excise impost being reduced to ¼ per cent instead of 1½, while the compliance tax was increased from 13½ to 19½ per cent. Captive tonnage was exempted from the provisions of the code, though subject to the act and the ¼ per cent tax.

In an endeavor to protect the interest of the consumer, an amendment was made providing that the Consumers' Counsel shall report direct to Congress and, further, that in the event that he does not approve coordination or prices as established, he may complain to the National Bituminous Coal Commission. A clause also was added to the effect that not more than one Commissioner shall be a resident of any one district or any one State. If a hearing be held to determine whether or not any producer supplying coal for the use of the United States or any agency thereof is complying with the labor provisions of the act, it is now provided that the Commission, instead of the National Labor Relations Board shall hold the hearing.

Senator Neely, of West Virginia, chairman of the Interstate Commerce subcommittee considering the bill, said today that his group had decided not to hold hearings on the measure. Written briefs presenting material in the nature of new or additional testimony not previously submitted will be accepted, however.

Representative Casey's bill would create a Federal Coal Trade Commission having supervision over the cooperative marketing of coal—both anthracite and bituminous. The Commission, comprising five members, would supersede the present National Bituminous Coal Commission, headed by Charles F. Hosford, and would take over all functions of the U. S. Bureau of Mines relating to coal. The bill provides for no code nor has it any labor provisions except that the Commission would gather statistics on the earnings of employees by occupations, etc.

Creating 24 producing districts and 13 market areas, the measure authorizes that there be set up in each production district a voluntary cooperative marketing association, to operate under the supervision of the Commission. The associations are to file with the Commission each week the fair market values, f.o.b. mine, for shipment into each market area of all kinds and sizes of coal produced in their districts, the values to be published weekly by the Commission. Each association and each non-member producer also is to file with the Commission and keep up to date the minimum prices, f.o.b. mine, for shipment into each market area, at which each kind and size of coal will be sold, these prices likewise to be published weekly by the Commission.

The bill would make it unlawful for any association or non-member producer to sell its coals either at prices below the fair market values, as determined by itself and filed with the Commission, or below the minimum prices filed. The Commission is given authority to issue cease and desist orders (subject to review by circuit courts of appeal) in cases of violation of the act, and penalties are provided for violations.

—❖—

New Mines Going Strong

Willow Grove and Dun Glen mines of the Hanna Coal Co., operating in eastern Ohio, registered a marked gain in output in January, each showing the largest total since starting operations. Willow Grove produced 91,447 tons, and the total for Dun Glen was 10,944 tons. The latter mine, which had been gradually getting into shape for heavy production, began producing in quantity early in February. When it reaches full operation it is expected that 500 or more men will be employed and two shifts will be worked.

—❖—

New Low Fatality Rate Set By Coal Mines in 1936

Coal-mine accidents caused the deaths of 1,010 bituminous and 240 anthracite miners in 1936, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. These figures, which are subject to revision, compare with 968 and 274, respectively, in 1935. The bituminous death rate last year was 2.338 per million tons, against 2.600 in the preceding year. The anthracite fatality rate last year was 4.383, compared with 5.253 in 1935. The death rate for both industries combined last year was 2.568, against 2.926 in the preceding year.

In December last there were 116 bituminous and 23 anthracite fatalities. With a production of 44,487,000 tons, the bituminous death rate in December was 2.59 per million tons, compared with 2.31 in the preceding month, when 41,588,000 tons was mined. The rate for December, 1936, was slightly more favorable, however, than that for the corresponding month of the preceding year. The anthracite fatality rate in December last was 4.44, based on an output of 5,180,000 tons, as against 3.65 in the preceding month, when 4,387,000 tons was produced, and 2.54 in December, 1935, when output was 4,726,000 tons. For the two industries combined, the death rate in December last was 2.78, compared with 2.44 in the preceding month and 2.77 in December, 1935.

Comparative fatality rates for the twelve months of 1935 and 1936, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES *

January–December, 1935 and 1936

Cause	Bituminous				Anthracite				Bituminous-Anthracite	
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Killed per Million Tons	
	1935	1936	1935	1936	1935	1936	1935	1936	1935	1936
Falls of roof and coal	524	592	1.407	1.370	140	122	2.684	2.228	1.564	1.467
Haulage	198	178	.532	.412	30	25	.575	.457	.537	.417
Gas or dust explosions:										
Minor explosions	17	19	.046	.044	10	11	.192	.201	.064	.062
Major explosions	9	23	.024	.053	13	5	.249	.091	.052	.057
Explosives	31	24	.083	.056	19	18	.365	.329	.118	.086
Electricity	43	40	.116	.093	2	8	.038	.146	.106	.099
Mining machines	30	15	.081	.035	2	....	.038	....	.075	.031
Other machinery	2	12	.005	.028	1	2	.019	.036	.007	.029
Miscellaneous:										
Minor accidents	32	37	.086	.086	12	20	.230	.365	.104	.117
Major accidents	6	9	.016	.021	....	....	....	....	.014	.018
Shaft:										
Minor accidents	13	10	.035	.023	3	7	.058	.128	.038	.035
Major accidents	....	....	....	....	7	....	.134	....	.016	....
Stripping or open-cut	15	8	.040	.018	12	8	.230	.146	.064	.033
Surface	48	43	.129	.099	23	14	.441	.256	.167	.117
Grand total	968	1.010	2.600	2.338	274	240	5.253	4.383	2.926	2.568

* All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

TRUCK BODIES

For use in quarries, coal strippings and in heavy construction work, Easton Car & Construction Co., Easton, Pa., offers the new Model GE-15H rear-dump truck body of $\frac{5}{16}$-in. high-carbon plate rigidly reinforced by one-piece machine-forged 4-in. H-beam body cradles and supported by 5-in. H-beam sills running lengthwise. Bodies can be fitted with 14-in. vertical or flared sideboards. The latter are recommended for handling coal in stripping operations. A 15-in. radius at the junction between floor and sides is said to assure quick, smooth discharge of wet and sticky material. The automatic tail gate drops down flush with the floor at a 16-deg. elevation, forming a discharge chute. Maximum elevation is 50 deg., accomplished by a hydraulic hoist in the truck chassis. Weight of the body with hoist is 9,600 lb. Capacities are: to shape, 8 cu.yd.; heaped, 12 cu.yd.; with 14-in. vertical sideboards, 14 cu.yd.

Easton also offers an open-end hydraulic-hoist streamlined dump body with a capacity of 7 cu.yd. to shape and 9 cu.yd. heaped for the same services as the GE-15H body. The original body was mounted on a Walter Motor Truck Co. four-wheel-drive chassis. Other capacities and dimensions are available to fit truck manufacturers' standards or users' wishes. The body is assembled of high-carbon plate and structural-steel members by arc welding and riveting, and a hydraulic hoist is mounted by the Easton organization. The unusual shape of the body was a result, the company states, of scientific designing and proportioning to give the maximum load-carrying capacity per top weight of body, as well as technically correct load distribution. The correct load distribution, it is stated, has a favorable effect on riding characteristics and consequently on truck life.

—⟡—

TRACTORS

Two additions to the standard line of Linn tractors have been announced by the Linn Manufacturing Corporation, Morris, N. Y. In the Model L-37, the body capacity has been increased to 12 to 15 cu.yd. and body and chassis parts have been correspondingly strengthened. The flexible-traction unit for positive footing and other fundamental design features, including a 50-deg. dumping angle, have been retained, however.

The other new unit (Model 37-T—see illustration) is a combination tractor-trailer with a body capacity of 25 to 30 cu.yd. for contracting, stripping and other haulage jobs where large capacities are necessary. The Model 37-T Linn, it is stated, employs the standard Linn tractor chassis with a specially designed trailer unit. The trailer body is of the two-way-dumping type with heavy-duty under-body hoists and automatic down-folding side gates. Dumping angle is 50 deg. The unit also is furnished with platform and stake bodies for general hauling. It is powered with a 6-cylinder Hercules gasoline engine, with diesel engine optional.

—⟡—

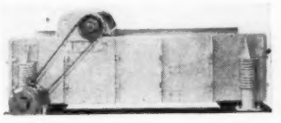
HEATING UNIT

Elimination of the extra complications of the steam-heating system is offered as the major advantage of the Lee "Direct-Fired" heating system of the Dravo-Doyle Co., Pittsburgh, Pa. This system is based on the use of either hand- or stoker-fired unit heaters with fans for directing hot air through ducts to the points of use. Oil-, gas- or coke-fired models also are available. The units are self-contained and may be used singly or in batteries of two or more, as indicated in the illustration. Dimensions of the No. 700 size, with an output of 700,000 B.t.u. per hour and a blower capacity of 7,500 c.f.m., are: length, 10 ft. 10 in.; width at floor, 5 ft. 2 in.; and height to top of hot-air outlet, 8 ft. 3 in. Units also are designed with the outlet at the bottom. In addition to incorporation in a duct system, the heaters may be used for "spot" heating through one or a number of elbows on the top outlet.

—⟡—

SCREEN

Robins Conveying Belt Co., New York City, offers the new "Eliptex" horizontal elliptical-stroke screen which it states both sizes and feeds material on a horizontal plane through either one, two or three decks. A feature of the screen is an elliptical-motion counterflow to the direction of travel of the material, said to cause the material to turn over and thus give all undersize pieces a chance to pass through the mesh. The vibrator is said to be of a simple, totally inclosed mechanical construction, and is provided with anti-friction bearings. One of these screens, 4x8½ ft. and operated by a 3-hp. motor, is said to have easily and efficiently sized broken stone at 1 in. at a rate of over 200 tons per hour.



—⟡—

BLAST-HOLE DRILL

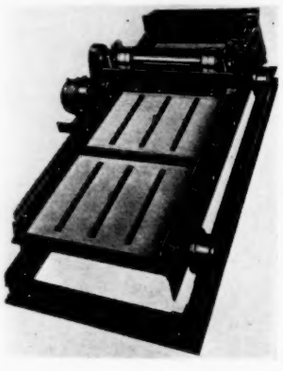
For putting down large-diameter (9- to 12-in.) blast holes at a faster drilling rate, Bucyrus-Erie Co., South Milwaukee, Wis., offers the new Bucyrus-Armstrong 42-T drill. Features noted by the company include: ability to swing up to 6,000 lb. of tools; Bucyrus-Armstrong rubber shock absorbers for greater drilling snap; wide-spread full-length crawler mounting

for quick and easy movement; all-steel, all-welded construction; power-driven tool wrench; use of engine power to raise the 48-ft. telescoping derrick; and choice of 80-hp. diesel engine or powerful electric motor.

VIBRATOR

Deister Machine Co., Fort Wayne, Ind., offers the new "Multirap" vibrator, designed for screening fine coal and particularly for making efficient separations of approximately 8-mesh or finer material. Two major objectives in the design, according to the company, were: prevention of blinding of the fine-mesh screen cloth and long cloth life. Others were: high capacity, high efficiency, ability to handle hot, dusty or wet materials, a design that would not impart vibration to the supporting structure, development of a special feed distributor, and suitability to driving from any source of power.

In the Multirap vibrator, the screen cloth is held under tension on separate removable panels mounted in a main frame which in turn is carried by a base frame by means of vibration absorbers. On the under side of each screen panel is mounted a striker, or impact mechanism, in a dust- and water-tight compartment. Mounted on the top of the vibrating frame is a shaft carrying unbalanced pulleys and operating at 3,600 r.p.m. The vibrations caused

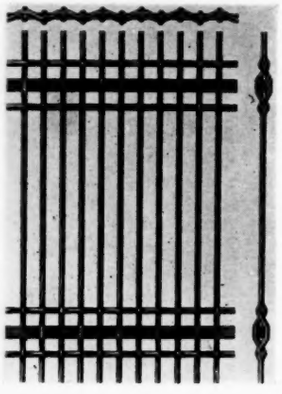


by the rotation of the unbalanced pulleys are carried through the main frame and into the screen panels, and these vibrations actuate the striker mechanism so that it imparts 3,600 sharp impacts per minute to the vibrator bars carrying the screen cloth. The impact, states the company, is what accomplishes the separation and is so effective in keeping the meshes open.

Another feature brought out by the maker is the fact that having each screen cloth carry its own impact mechanism makes it possible for the operator to adjust the intensity of the vibration of each individual panel frame, or, in other words, makes it possible to graduate the vibrations from intense at the feed end to light at the discharge end.

SCREEN

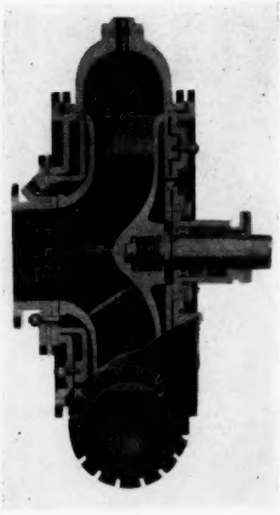
Ludlow-Saylor Wire Co., St. Louis, Mo., has brought out a newly developed improvement in its long-mesh woven-wire screen designed to give all the advantages of maximum open screening area inherent in the long-mesh type of screen, but eliminating



stretching under tension. In the new Sta-Tru type of screen, the tensioning members of the screening equipment exert their pull exclusively on straight, uncrimped staybars of high tensile strength which are woven into the screen in combination with two or more crimped spacing wires to maintain the longitudinal screening wires in their proper relationship and uniform spacing throughout the life of the screen.

PUMP

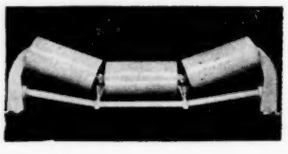
American Manganese Steel Co., Chicago Heights, Ill., now offers the "Amsco Counterflow" pump for handling liquids carrying abrasive materials. In addition to correct manganese-steel applications, the company points out the following features: wide funnel-mouth impeller; threading of the impeller



bore; elimination of internal leakage; and greatly reduced internal wear by introducing clear water, under pressure, between the impeller shrouds and shell side plates. This new design, it is stated, is available not only in all sizes and types of new Amsco pumps but also may be applied to practically all pumps now in service at a nominal cost.

BELT CARRIER

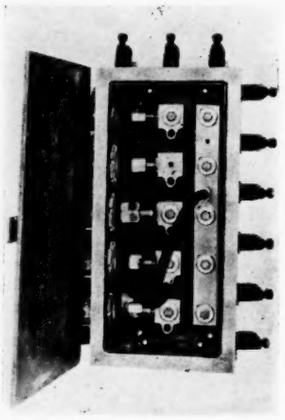
A new "truss-frame" sealed-ball-bearing belt-conveyor carrier, said to be "light, strong and comparatively inexpensive," has been brought out by the Stephens-Adamson Mfg. Co., Aurora, Ill. Built in sizes for belts 18 to 48 in. wide, the carrier is of the three-rolls-in-line type with the outer rollers inclined to give the belt a 20-deg. trough.



The roller assembly, it is stated, is tilted to center the belt without guide rollers and particular effort has been made to produce a carrier that would minimize wear and tear on the belt. Renewable cartridge-type bearings packed with grease and sealed at the factory are used throughout. Rollers are made of 5-in.-diameter steel tubing, and the truss-type frame is declared to be light and rigid, with the load carried by a tension rod instead of depending upon the stiffness of a heavy cross member for support.

JUNCTION BOXES

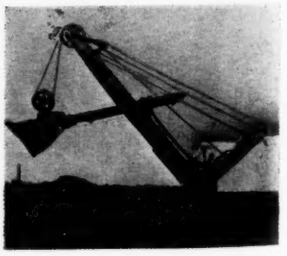
Anaconda Wire & Cable Co., New York City, offers new "Everdur" cable-junction boxes which it states eliminate the necessity for further concern over porosity, destruction by corrosion or immersion in acidulous or alkaline surface waters or damage from accidental impact.



In addition to the advantages of tightness, corrosion resistance and ability to withstand shock, the welded Everdur type of box represents, it is asserted, an appreciable saving in weight and consequently is easier to install.

EXCAVATOR

Harnischfeger Corporation, Milwaukee, Wis., offers a new high-speed all-purpose diesel- or gasoline-powered excavator (Model 455) with Allis-Chalmers tractor-type crawlers and a capacity of 1 cu.yd. Weight of the unit, the company states, has been radically reduced by the use of new high-tensile steels and electrical welding, yet it is much stronger and more rigid



than its predecessors, with greater than the usual protection against weaving. A two-speed transmission is provided for every movement in travel and digging. Better protection against tipping strain is another feature stressed by the manufacturer.